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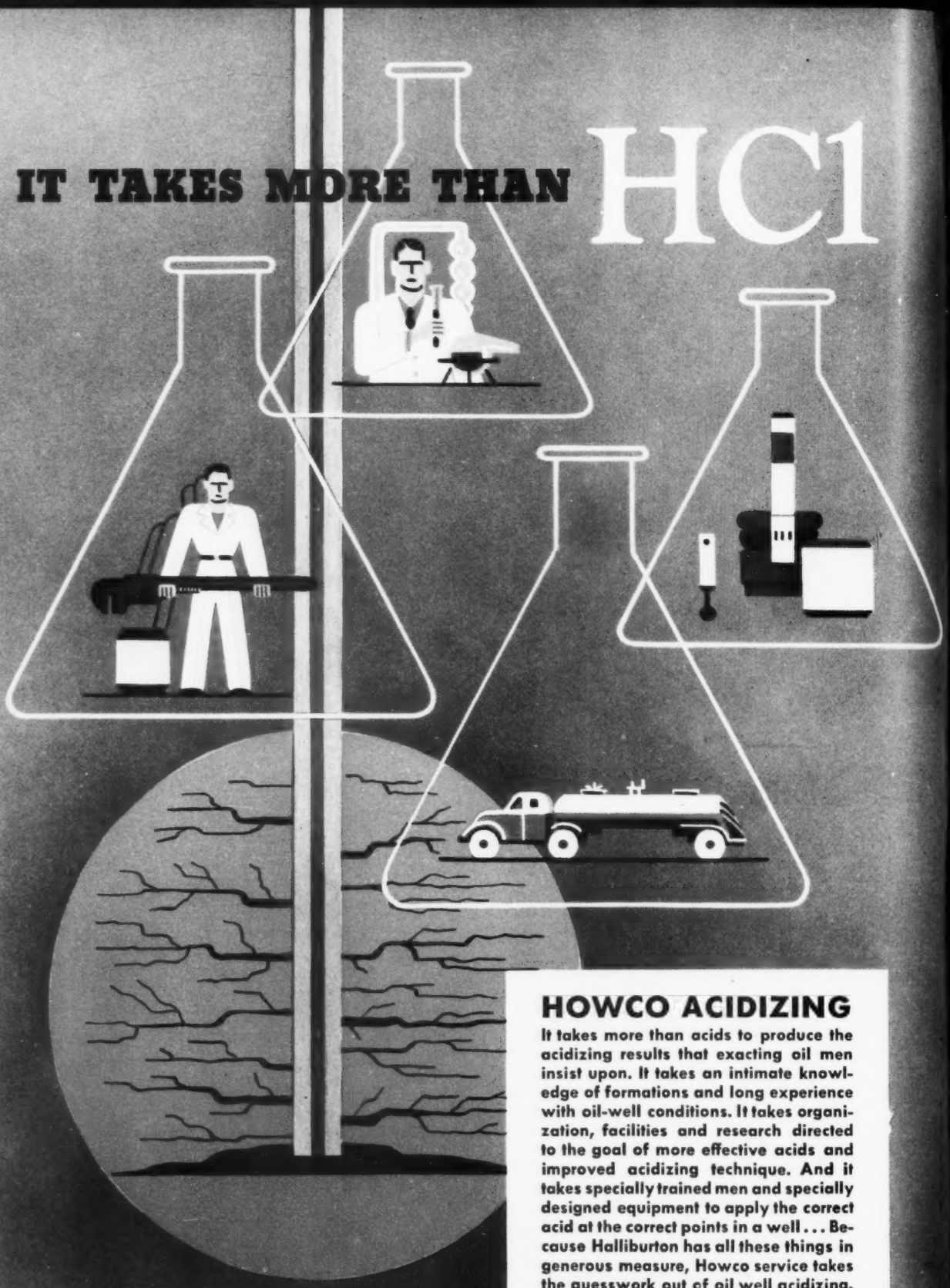

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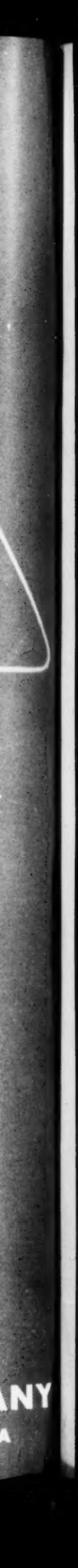
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THE OIL AND GAS JOURNAL

Oil and Gas Program

MEMBERS of the Independent Petroleum Association of America last week in the final sessions of their annual meeting at Fort Worth approved a national oil and gas policy, a clear statement of belief and intent which leaves no questions unanswered as to where the membership stands with regard to peacetime petroleum. The program represents intensive study and consideration of postwar conditions by those whose experience, in most instances, covers two world wars and the intervening period in which petroleum became a major enterprise.

As we interpret the several features of the national program, the independent producers are asking that the petroleum industry be left alone to continue in the future what it has been doing in the past, for the same reasons and with the same objectives. Operators are asking, "What is wrong with the record of the past and what proof is there that it can't be duplicated in the future?"

It is recognized by the independent operators that adequate petroleum supplies at reasonable prices are mandatory in a sound public policy for normal and emergency conditions. It is their contention that the required domestic oil can largely be produced within the boundaries of this country.

As to supplies, emphasis is placed on prices sufficient to justify greater outlays in finding and producing new oil. Operators have plenty of data as to what is required in increased expenditures to find oil to replace that which is being produced.

The independent operators are also particularly interested in the possibilities of increasing recoveries in established reserves. The backbone of many smaller operations consists of settled production in old fields, much of it of the stripper class, and if prices at the wells do not reflect the higher operating costs, known reserves are lost and the funds and incentives to find new reserves are not available. The entire application of sound conservation principles revolves around the matter of returns from operations where the oil has already been found.

As regards secondary recovery, many informed operators are of the opinion that only a start has been made in what can be done in recovering crude oil, after the primary field operations are completed. Fair prices have the dual function of finding new oil and increasing the recoveries in known horizons.

There is nothing new in these and other features of the national oil and gas policy as approved at Fort Worth. Unhampered by regulations and threats from Washington, and with conditions favorable for a "vigorous search for oil and gas by a strong, healthy, experienced, competitive industry," the operators feel that the oil business can do the petroleum jobs of the future as they have in the past. The independent producer has stated his views. Other segments of this industry should be equally frank.

Jacobsen, Zook Take Issue With Anglo-American Resolution

TWO well-known figures in the petroleum industry—Ralph T. Zook, Bradford, Pa., operator, and A. Jacobsen, New York, president of Amerada Petroleum Corp. — have taken strong exception to last week's action of the Independent Petroleum Association of America opposing ratification of the Anglo-American oil agreement.

In a letter to B. A. Hardey, I.P.A.A. president, Jacobsen cited the preamble of the resolution passed at the I.P.A.A.'s Fort Worth meeting which said I.P.A.A. members who aided in the negotiations of the agreement "are not satisfied with the construction placed upon provisions of said treaty by representatives of the State Department and Government of the United States."

Jacobsen said he was, as one of the members referred to, "at a loss to understand by what authority I am being quoted." He said the "effects, scope, and purposely designed limitations of the agreement have been correctly described in all official statements on the subject which I can recall having seen."

"In my opinion," he continued, "the ratification of the Anglo-American oil agreement is just as desirable today as it was a year ago when its approval by the Senate was unanimously urged and recommended by the membership of your association at its annual meeting in Tulsa."

Jacobsen said the desirability of ratification "is in no way affected" by views recently expressed by John A. Loftus and Charles B. Rayner, State Department officials, to which, he said, he was "most strongly opposed." These views would, he added, go far beyond the scope and limits of the said agreement and be "seriously prejudicial" to the national interest as well as to that of both the domestic and foreign oil industry.

Zook, who was prevented by illness from attending the meeting, is a former president of the I.P.A.A., was a leader in drafting the association's national oil-policy statement, and one of the advisers to the secretary of the interior in negotiating the Anglo - American agreement in September 1945. His statement opposing the Fort Worth resolution was similar to that of Jacobsen in that he disagreed with the statement in the preamble and also asserted was not in sympathy with the Loftus-Rayner views.

"I am in complete disagreement with the resolution . . . passed by the membership October 30," Zook said Though Zook made it plain he disagreed with Loftus and Rayner, he said, however, he had "at no time seen any statement by them or any member of our Government or the English government that the agreement has any powers or designs that are different from my understanding.

"I believe it is most important that an oil treaty be concluded between the United States and England. I see no way the present one can bring about federal control of the oil industry by the federal Government or by an international commission. A simple statement by the Senate, in approving this agreement, declaring that it does not confer upon the Congress of the United States any new or added power to regulate or control the domestic petroleum industry will insure adequate protection for those who are concerned about federal control.

"The resolution approved by the association is not factual. No one was authorized to quote me in connection with it. I can speak for myself."

A.P.I. Set for Next Week's Meeting; Public Relations a Highlight

THE entire subject of public relations in the petroleum industry will be thoroughly explored at the American Petroleum Institute's Chicago meeting next week in a section of the program that is slated to hold the center of nontechnical interest.

While the industry's prospects for the future and the A.P.I.'s agricultural cooperation program also are important subjects for general-interest discussion, public-relations problems is the highlighting theme of the twenty-sixth annual meeting November 11-14.

A general session Tuesday evening and a forum the following morning both will be devoted to the public-relations question. At the general session, results of work of the A.P.I.'s public-relations committee and public-relations advisory subcommittee will be disclosed for the first time. What the public thinks of the oil industry will be described at the general session by Dr. Claude Robinson, president of Opinion Research Corp., when he gives the results of a comprehensive public-opinion survey conducted by his organization for the A.P.I.

The forum Wednesday morning will include an unrehearsed question-and-answer period with two panels, one comprising editors of petroleum trade journals, and the other of public-relations men from the petroleum industry. Members of the trade-press panel will be: P. C. Lauinger, publisher of The Oil and Gas Journal; Keith J. Fanshier, oil editor of the Chicago Journal of Commerce; Milburn Petty, editor of Petty's Oil Letter; Ray L. Dudley, publisher of the Oil Weekly and Petroleum Refiner; and Warren C. Platt, publisher of the National Petroleum News. The panel of public-relations men will be John L. Dupress, of Ivy Lee and T. J. Ross, counsellors to Socony-Vacuum Oil Co., Inc.; Clarel B. Mapes, general secretary, Mid-Continent Oil and Gas Association; Conger Reynolds, public-relations director, Standard Oil Co. (Ind.); Edgar Waite, public - relations director, Standard Oil Co. of California; and John Wieland, advertising manager, Standard Oil Co. (Ohio).

Speakers at the forum session will be Fred Eldean, public - relations counsellor, who will discuss the nature of the oil industry's proposed program; Don E. Gilman, executive secretary of Western Oil and Gas Association; and Ralph C. Champlin, director of public relations, Ethyl Corp., who has played a prominent part in formulating the oil industry's program.

Besides Dr. Robinson, two other speakers are scheduled for the Tuesday evening general session. John J. Pelley, president of The American Association of Railroads, will tell of methods used by the railroad industry in its public-relations work; and Robert T. Haslam, vice president, Standard Oil Co. (N. J.), who will speak on "Progressive Public Relations for the Progressive Petroleum Industry."

A.P.I. officials are expecting an attendance of well over 2,000 for the meeting. Headquarters will be at the Stevens Hotel.

For other general sessions, the institute last week disclosed the names of three top-ranking speakers added since the preliminary program was announced. They are Reese H. Taylor, president of Union Oil Co. of California; Alfred P. Sloan, Jr., board

chairman of General Motors Corp.; and John L. Collyer, president of B. F. Goodrich Co., who will address Thursday evening general session.

Others who will address group and general sessions and whose names were not announced until late last week are A. W. Turner, assistant chief in charge of agricultural engineering, U. S. Department of Agriculture, Washington; and John Strohm, Association of Agricultural Editors, Chicago. Turner will speak at a November 11 group session and Strohm at the November 13 general session.

Presenting the Government's viewpoint on petroleum will be Secretary of Interior J. A. Krug, who will be making his maiden speech before an A.P.I. meeting.

Dovetailing into the public relations theme this year will be an address, November 12, by H. L. Patch, comptroller, Standard Oil Co. of Ohio, on "Annual Reports of Oil Companies—Do They Tell the Story?" Also on the financial and accounting committee's program are addresses by George Bowdon, special assistant to the comptroller, Socony-Vacuum Oil Co., Inc., who will discuss "Improvements in Refined - Products' Costing Methods;" and D. B. McNamara, assistant secretary, The Chicago Corp., who will speak on "Accounting for Cycling Plant Operations." Bowdon is slated to talk November 12 and McNamara, November 13.

I.P.A.A. Votes Oil-Policy Statement; Withdraws Pact Approval

BEFORE bringing their seventeenth annual convention to a close last week in Fort Worth, members of the Independent Petroleum Association adopted a national oil-policy statement, reelected all principal officers, and went on record opposing ratification of the Anglo-American oil agreement.

Theme of the national oil-policy statement was a strong, healthy competitive industry. It declared the United States is not running out of oil and asserted the "road to petroleum security rests on the skill, enterprise, and technological genius of the domestic industry."

Topping this subject in immediate interest was the controversial discussion over the Anglo-American oil agreement. The resolution withdrew the approval which the association gave to the agreement at its year-earlier meeting in Tulsa.

The resolution passed at Fort Worth declared it "is now the considered opinion of this association that there is no necessity or justification for any treaty between the United States and any foreign nation relating to the production and distribution of crude petroleum and/or its derivatives" and that "the proposed treaty will provide the means and vehicle for the control and regulation of the oil industry by the federal Government and by an international commission."

The resolution was introduced by Glenn H. McCarthy, prominent Houston operator, after George A. Hill, Jr., president of Houston Oil Co. of Houston, proposed that the association withhold its approval unless and until reservations were incorporated in the agreement protecting the American oil industry against alleged misinterpretations by government representatives. In the heated discussion on the subject, W. A. Moncrief, Fort Worth, offered a compromise which would have put the two resolutions to a mail vote of the I.P.A.A. membership. This was voted down.

Other resolutions adopted at the meeting declared the opposition of the association "to participation by our Government or its nationals, in world or regional or other cartels, relating to oil, gas, and oil and gas products," and asked the next Congress to consider "the desirability of compelling federal agencies now in possession of mineral rights under lands previously sold to quitclaim such rights to owners of the surface at no consideration in money or otherwise."

Participants in a panel discussion at the Fort Worth meeting of the Independent Petroleum Association of America on various subjects of interest to independent producers were: Top—Minor Jameson, Jr., Washington, I.P.A.A.'s petroleum economist; R. C. Kay, Amarillo, Tex.; J. P. Coleman, Wichita Falls, Tex.; Merle Becker, St. Louis; and Eugene Jordan, Oklahoma City. Bottom—M. G. Cheney, Coleman, Tex.; Howard P. Holmes, Dallas; Don T. Andrus, Bradford, Pa.; T. H. Marshall, Oklahoma City; George H. Bruce, Wichita, Kans., and Rush Blodget, Los Angeles

Several questions pertinent to problems facing independent operators were answered at the Fort Worth meeting in a panel discussion by those who have made special studies of the various phases of petroleum operations. Excessive nominations of refining organizations in the determination of crude-oil allowables by state regulatory bodies were blamed for large increases in product inventories in recent weeks. This situation is particularly critical in Texas. The state commissions, in correcting this condition, must decide whether to take refinery nominations or actual consumptive demand as the base in determining allowables. Pipe-line divorcement was also suggested as an answer to this problem.

Julius Fohs estimated the petroleum reserves of the Middle East to be 100 billion barrels and said that those of Russia including areas it now controls are probably as large. Another answer placed natural-gas reserves in this country at 160 trillion cubic feet which could be converted to 16 billion barrels of motor fuel with present known processes. The industry is making progress in getting better prices for its natural gas, a panel member explaining that new carbon-black plants are paying 3 to 3½ cents for gas in contrast to prewar prices as low as 0.9 cent per 1,000 cu. ft.

Relative to deep drilling it was pointed out that equipment is now available to drill to 20,000 ft. It was suggested that the Army-Navy might consider a research program to determine how oil information which will not be produced with present practices can be recovered. It was estimated that this residual oil totaled 100 billion barrels.

News from the Fort Worth convention of the Independent Petroleum Association of America and a condensation of the speech by Charles B. Rayner, State Department petroleum adviser, was published in The Oil and Gas Journal November 2, pages 36 and 37.

California operators will not suffer from the competition of natural gas brought in from Texas in a large pipeline project now under way. The delivered price of the Texas gas will be 19½ cents. Questions brought forth opinions that present imports of approximately 400,000 bbl. daily to this country are excessive along with the contention that over-all additions to reserves in this country are greater than consumptive requirements. Suggestions that natural-gas systems be made common carriers in order to provide a more equitable division of outlets for producers brought negative answers.

Annual Banquet

"This country is not facing a shortage of petroleum," Maston Nixon, vice president of Southern Minerals Corp. of Corpus Christi declared at the annual banquet of the association. "After fueling the greatest war of all time, it has in excess of 20 billion barrels of crude-oil reserves and 160 trillion cubic feet of gas," he said. Nixon, the principal speaker at the banquet, criticized government interference in petroleum operations, concluding, "Let our Army and Navy tell the petroleum industry in specific terms the type of products and quantity needed in a national emergency then the industry will set out at once to meet the need—we have never failed."

Hardey Given Second Term

B. A. Hardey, Shreveport, was re-

(Continued on page 52)

Grady Vaughn, Jr., presided at a luncheon session during the Fort Worth meeting of the Independent Petroleum Association of America as a part of the recognition given younger men of the oil industry

Principles of a Sound National Oil Policy

THE Independent Petroleum Association of America, having foremost in mind that every national policy must have as its primary purpose the serving of the public interest, believes that the following principles are essential to the achievement and maintenance of a strong position for this nation as to oil and gas:

1. The basic objective of a national oil and gas policy must be the assurance that the United States shall continue to have adequate supplies of petroleum for all peacetime and emergency requirements.

2. Continuing adequacy of petroleum supplies depends upon the maintenance of ample productive capacity from accessible proved reserves.

3. Adequate productive capacity requires continued, vigorous searching for new sources.

4. The search for oil and gas can most effectively be carried forward by the private venture capital of a strong, healthy, experienced, competitive industry.

5. Our proved reserves can best be devoted to the public interest by production methods that conform to sound conservation principles.

6. The price of oil and gas within the United States should be sufficient to encourage the exploration for and development of new production, preserve wells of small production, encourage secondary-recovery operations, and promote conservation.

7. The national security requires a policy as to petroleum imports which will not retard the exploration and development efforts in the domestic industry.

8. The public interest requires that Government shall not participate, directly or indirectly, in the operations of the petroleum industry.

9. Jurisdiction over the production; processing in all its incidents, gathering, compressing, sale and delivery of natural gas at the point where its interstate movement commences must remain with the state regulatory agencies; and no jurisdiction over such matters should be conferred upon the Federal Power Commission or other federal agencies.

10. Full utilization of the nation's proved reserves calls for expanded use of secondary methods of petroleum recovery.

11. Research activities should be expanded and intensified in all fields, including the development of petroleum products from natural gas, coal, shale, and other sources of synthetics.

12. There should be continuance of the well-established tax provisions which recognize the peculiar conditions and the financial risks inherent in the producing branch of the oil and gas industry.

13. The exploration and development by private capital of petroleum deposits underlying the public lands should be facilitated and encouraged.

14. American nationals should be encouraged to extend their operations in foreign lands, and should receive strong, continuing diplomatic support in these activities.

THIS 1946 S M T W T F S WEEK

DRILLING— New deep-drilling records set in Oklahoma and Mississippi. . . . Superior Oil drilling ahead below 14,651 ft. on wildcat near Fort Cobb, Okla. . . . Another Superior Oil wildcat at 15,683 ft. in Forrest County, Mississippi. . . . New California depth record near in Pacific Western Oil's Kern County test, now at 16,025 ft. . . .

THE TREATY— Ralph T. Zook, A. Jacobsen issue statements sharply differing with controversial I.P.A.A. resolution opposing ratification of Anglo-American agreement. . . . Both assert there is no basis for statement in resolution that I.P.A.A. members who aided in negotiating agreement "are not satisfied" with interpretation placed on provisions by State Department and other government officials. . . .

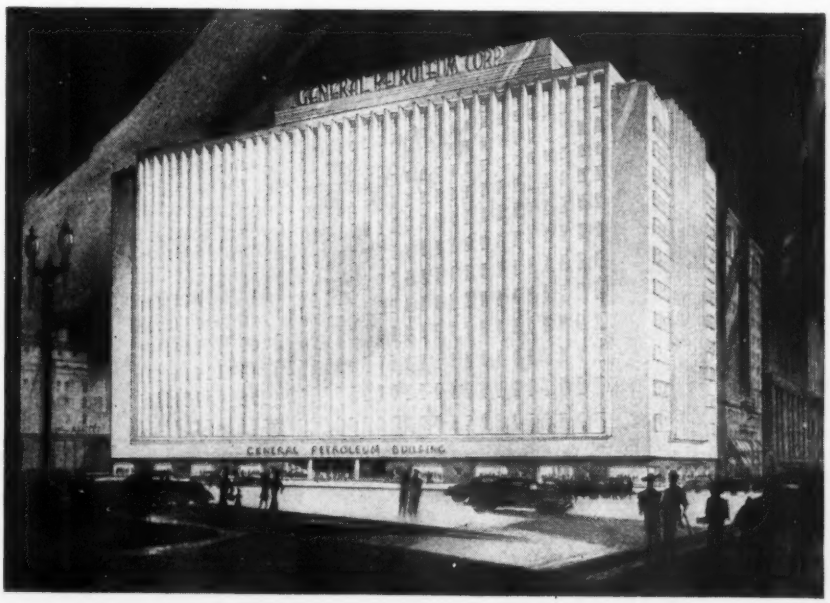
REGULATION— Some 30 gas wells ordered closed in Carthage field, Panola County, Texas, by Railroad Commission for exceeding allowable production. . . . Wells belong to Chicago Corp. and others supplying T. G. & T.'s West Virginia pipe line. . . . Dispute also involves 40,000 bbl. distillate made from allegedly overproduced gas. . . . Commission refuses tender to move the produce. . . . Commission's action and the proration order results in district court injunction suit filed in Austin by Chicago Corp., Clyde H. Alexander and W. C. Feazel. . . . Petition admits commission's authority but correlative rights not safeguarded. . . .

TRANSPORTATION— To keep European refineries in operation and to supply Army-Navy needs in Europe, Maritime Commission orders 35 tankers withdrawn from reserve fleet and placed in service. . . . Action reportedly taken on orders from White House following an appeal by British authorities. . . .

PRODUCTION— Bureau of Mines forecasts total U. S. crude demand in November of 4,730,000 bbl. daily, compared to 4,771,000 bbl. in October. . . . Texas demand set at 2,090,000 bbl.; Oklahoma, at 383,000 bbl.; Kansas, at 263,000 bbl. daily. . . . ¶U. S. crude production up 18,165 bbl. daily in week ended November 2 to daily average of 4,767,730 bbl. . . . ¶Burning oil stocks show signs of leveling off. . . . Marketers cheered by colder weather and indications of start of winter consumption. . . .

THE GOVERNMENT—House committee investigating WAA sets hearings on big-inch pipe lines to open November 19. . . . Witnesses invited, including Ickes, John L. Lewis, Jesse Jones, promise interesting testimony. . . . ¶Interior Department releases new regulations on government public-land leasing. . . . ¶Head of CPA's chemical division sees little chance of substantial relief in lead shortage until late 1947. . . . Lead producers tell Government free market could solve shortage, urge removal of price controls, importation of foreign material, and relaxing lead allocation control. . . . ¶CPA authorizes sale of synthetic rubber for export. . . . Order indicates fast-improving natural-rubber supply and foreshadows efforts in next Congress for legislation to protect synthetic industry.

INTERNATIONAL—Russia tells of achievements in petroleum field in report on first year of new 5-year plan. . . . Says Moscow is already receiving some gas through Saratov-Moscow line and that construction has commenced on Dashava-Kiev line. . . . Report says intensive drilling conducted in Baku, Azerbaijan fields. . . . Agwi Petroleum, Anglo-American Oil, Ltd., subsidiary, announces plans for large-scale expansion of refinery near Southampton. . . . Colombia troubled by labor unrest resulting from high living costs. . . . Oil strike involves some 10,000 employes of six operators. . . .



Construction of the first height-limit building to be erected in metropolitan Los Angeles for more than a decade will be undertaken in the near future by General Petroleum Corp., western affiliate of Socony-Vacuum Oil Co. The completely modern office building will be a half block deep and will front on the east side of Flower Street for an entire block, extending from Sixth Street to Wilshire Boulevard. Representing an over-all investment to exceed $5,000,000, the building will consist of a street floor and 12 additional stories with about 450,000 sq. ft. of floor space. Start of construction is contemplated about July 1947, according to S. J. Dickey, General Petroleum president. Upwards of 1,200 General Petroleum employes will occupy administrative offices while some surplus floor space and street floor stores will be offered for rent. In addition, a garage building will be erected on property owned by General Petroleum at the northwest corner of Eighth and Flower Streets to service the office building

International

WORLD-WIDE OIL DEVELOPMENTS

Phillips Begins Expanded Development Program in Venezuela

PHILLIPS VENEZUELAN OIL CO., a wholly owned subsidiary of Phillips Petroleum Co., is launching an expanded development program on its Mata Grande group of exploitation concessions in the State of Monagas, eastern Venezuela, on which first commercial production recently was established, the company said in a recent review of its activities in the area.

The first test well which P.V.O.C. commenced in Venezuela encountered good petroliferous section. The well went out of control during completion and blew wild for 5 days. After getting it under control, several weeks were spent in reconditioning the hole and the well has only recently been completed, producing approximately 400 bbl. of 22°-gravity oil on a small choke.

In the meantime, a second well 3/5 of a mile south of the discovery well has been completed for 250 bbl. of 35°-gravity oil per day through a small choke. At the present time a third well is being completed, and drilling operations are in progress on seven additional wells, the company said.

The seven active operations of the company extend over an area measuring approximately 2 miles east and west and 1 mile north and south. The well spacing pattern for the initial development consists of equilateral triangles 660 m. to the side. It is probable that there will be some interspacing when more is known of the drainage characteristics of the reservoir, according to the report.

Closely following the completion of the first producer, the first of three 20,000-bbl. storage tanks was erected, and surveys have been made for a pipe-line outlet. A temporary camp including housing for 12 staff families and for 32 workers' families has been completed, and plans are under way for a permanent camp.

The blowout well (FT-1) had an oil and gas section of several hundred feet of sands and shales. Prior to the blowout, casing had been cemented through the section and perforated in a 20-ft. zone around 4,581 ft. The well started to unload as the perforating gun was pulled. First oil sand in the section was encountered at 4,706 ft. but no production tests had been made below that depth at that time. Present production is from 4,698-4,708 ft.

The second well (FT-3) was drilled to a total depth of 5,458 ft. Five-inch casing was set and cemented at 5,080 ft., and perforated at 4,660-70 ft. This well flowed initially at the rate of 250 bbl. daily through a small choke with 300 psi. working pressure on the 2-in. tubing. Gas-oil ratio was 550 cu. ft. per barrel. Gravity of the oil is 35° A.P.I. The producing zone is in the La Pica formation of Miocene age.

Size of Concession

The concession, comprising approximately 25,800 acres, is located on the Jusepin-Santa Barbara trend. Present development is in the extreme northeast corner, from 3 to 4 miles southeast of the southwestern extremities of prolific Santa Barbara field.

There are three pipe-line outlets with close proximity to the Phillips concession; thus, it appears there will be a ready market for this production, the company report continued.

An all-weather highway extending from Puerto La Cruz to Santa Barbara and Jusepin fields also passes just north of the Phillips block and provides access to the new operations. At Puerto La Cruz, the Phillips company has established a permanent camp and base from which operating supplies are furnished to its various blocks.

Including the Mata Grande block, this company has five Venezuelan concessions, located in the states of Monagas, Guarico, and Anzoategui. These total approximately 869,000 acres of which 738,000 acres are embraced in exploration concessions and 131,000 acres in exploitation concessions. Three of the blocks, embracing about 660,000 acres, consist entirely of exploration concessions. A fourth, with 176,000 acres, is about equally divided between exploration and exploitation concessions, while Mata Grande, the fifth, is entirely an exploitation grant.

Blocks Obtained in 1945

Phillips entered Venezuela in December 1944, opening its office at Caracas. The blocks were obtained during the early part of 1945, which allows the company until 1948 to make its acreage selections from the exploration concessions for exploitation purposes. At this time, three seismograph, one magnetometer, and three gravity meter crews are engaged in intensive geophysical surveys to evaluate the exploration concessions.

The Mata Grande block is the first on which any development drilling has been undertaken. Drilling was started in the autumn of 1945 with three company rigs being moved in initially. One of these was a light, "slim hole" rig for exploratory drilling. It since has been moved to one of the other blocks and replaced with a heavier contract rig. To augment these rigs the company has shipped three additional rigs from the United States during the past month, and they are now on location on this property.

Oil Strike Reported in Third Chilean Well

SANTIAGO, Chile.—Well No. 3 of Spring Hill oil field near the Straits of Magellan has begun producing high-grade oil after first yielding only gas, Oscar Carjardo, Minister of National Economy, announced last week.

Carjardo said results of the third well show Spring Hill field holds a larger volume of oil than was indicated by Wells 1 and 2. Chile's discovery well came in last December 29, while the second well, early this year, was dry.

State Department Moves to Support Nationals in Europe

NEW YORK.—With the U. S. State Department now committeed, though somewhat indefinitely, to giving support to its nationals' foreign holdings in Europe and elsewhere, oil men here are wondering how long it will take the diplomats "to set the record straight" in Austria and Romania, two of Europe's Soviet-dominated countries.

And of equal interest here is the report from Vienna that the chief British member of the Allied Council for Austria, Lt. Gen. Sir James Steele, has pointedly asked the Russians how long they plan to continue repudiating the new Austrian control agreement. The question assumes added significance in that this marks the first time the British have taken such a direct move. Heretofore, it was the U. S. Army members of the Allied Council who took the leading role. The Russians continue to refuse recognition of any Austrian legislation which the Soviet disapproves.

Austria, in its July 26 move to nationalize heavy industries, included the Zisterdorf oil fields in the Soviet occupation zone. Russia, which usually approves of nationalization procedures, has refused to recognize the Austrial Government's nationalization program on the ground that it violates the Potsdam agreement clauses regarding "Nazi assets." Actually there has never been a definition of Nazi assets and Russia has played a lone game in making its own definition. However, in view of the U. S. State Department's new stand, as explained by Under Secretary of State William L. Clayton, October 25, indications are that foreign holdings—and in the Zisterdorf area British and United States ownership dominates—may revert, sooner than expected, to the proper owners.

Explaining that in the case of foreign petroleum and other mineral rights held by the United States nationals, Clayton said that the United States might soon be prepared to back up these rights in the same forceful manner as the British. The reason, Clayton continued, was that the United States was suffering depletion or near depletion of some national resources. And while most oil men won't agree with the under secretary regarding either depletion or near depletion of petroleum in this country, it is certain that many of them, with foreign holdings, will receive Clayton's other statements with acclaim.

However, as one oil man here puts it, "we've not begun to spend the paltry $1,500,000 which the Soviet promised to pay but hasn't yet in Austria." (The Journal, October 19.)

Meanwhile, State Department policy regarding foreign oil and other interests appear to have undergone a change, as indicated in the administration of a stimulant in the form of Under Secretary Clayton's forecast.

Tanker Reserve Tapped on British Appeal

NEW YORK.—A direct appeal to the White House by interested British oil officials has resulted in the Maritime Commission releasing 35 sea-going tankers from the so-called reserve fleet. Presumably the "tanker pinch" is also being felt by the U. S. Navy, although it is not known where the Navy will put its additional tankers in service, or exactly how many more than 35 will get up steam.

Earlier this fall, indications were that the life of the U. S. Maritime Commission, as a tanker operator, would be largely dependent on the undisclosed Army-Navy demands for more tankers.

French sources revealed that the tanker need was so great that unless at least 10 tanker loads of crude reached France shortly, four refineries might have to go off stream temporarily. France's prewar tanker fleet, which numbered about 38 (dwt 432,000), will have to be augmented.

Further information in regard to the Maritime Commission's action releasing reserve tankers is included as a part of Watching Washington, page 51.

Before the war her tankers handled only about one-third of crude and product imports.

The combined needs of the U. S. Navy and Great Britain is for upwards of 40 additional tankers. Earlier this year when there was speculation as to whether the Maritime Commission would be out of the tanker business by the end of 1946, it was admitted that undisclosed Army and Navy tanker needs might be the determining factor (The Oil and Gas Journal, September 28, p. 60).

British sources state that although Britain was coasting along on high stocks built up last year she is currently short about 25 tanker loads.

International

Complete Plant Planned By Agwi at Southampton

LONDON. — Expansion plans for Agwi Petroleum Corp., Ltd.'s refinery at Fawley, near Southampton, probably will call for an increased daily capacity from 12,000 bbl. as at present to upwards of 69,000 bbl. daily. Agwi is a subsidiary of Anglo-American Oil Co., Ltd., which in turn is owned by Standard Oil Co. (N. J.)

Planned as a complete refinery, the expanded construction will include additional cracking facilities and vacuum - distillation units for high-grade lubricating oils. The expenditure has been estimated at $40,000,000, with actual work to get under way in the near future. However, approval by the British Government is necessary in that about 25 per cent of the expenditures will have to be in U. S. dollars.

When the additional units are added, Venezuelan crude may be used at first, but later it is planned to obtain most of the crude from Iraq. Agwi is the refining arm of Anglo-American.

Colombian Refinery for Royalty Crude Proposed

BOGOTA,—If Colombian Congress approves the recently introduced bill of Sen. R. Penaranda to build a refinery to process royalty crude from the Barco concession, the refinery presumably would be relatively small. During August of this year, the total royalty oil amounted to 57,683 bbl. Broken down, this figure shows that 26,262 bbl. came from Tibu field and 31,421 bbl. from Petrolea field.

As the royalty crude has been taken in cash to date, an indication of what Colombia is getting monthly from the Barco concession is the fact that August royalty payments amounted to $73,980. The per-barrel payment during August, for Tibu oil, was $1.08 and for Petrolea, $1.44. Total payments this year to Colombia from the Barco concession's royalty oil, to June 20, was $549,561.

Colombian Petroleum Co., jointly owned by Socony-Vacuum Oil Co., Inc., and The Texas Co., operates the famed Barco concession. Total royalty oil which Colombia is now taking in cash from all companies approximates 6,500 bbl. daily

Well-informed sources here believe that the Colombian government is not yet ready to enter the refining business on its own.

No. 5 Station on the pipe line from Poza Rica to Atzcapotzalco

MEXICO TODAY

Refining, Pipe-Line Activities

IN the 8½ years since properties of foreign oil companies were expropriated, Mexico's government-operated oil industry has succeeded in increasing the capacity of the country's refineries nearly 44,000 bbl. daily, or about 40 per cent to 153,800 bbl. daily. While no new plants have been built, five of the six refineries taken over in 1938 have been enlarged and improved.

Most noticeable achievement of Petroleos Mexicanos, the government oil administration, in the refining field has been its work at the Alzcapotzalco refinery about 6 miles from Mexico City. This plant, property of Aguila Oil Co. (Royal Dutch-Shell interests) before expropriation, has been transformed into a complete refinery with a capacity of 23,000 bbl. daily. Further improvements now under way will give the refinery a total capacity of 50,000 bbl. early next year.

International
WORLD-WIDE OIL DEVELOPMENTS

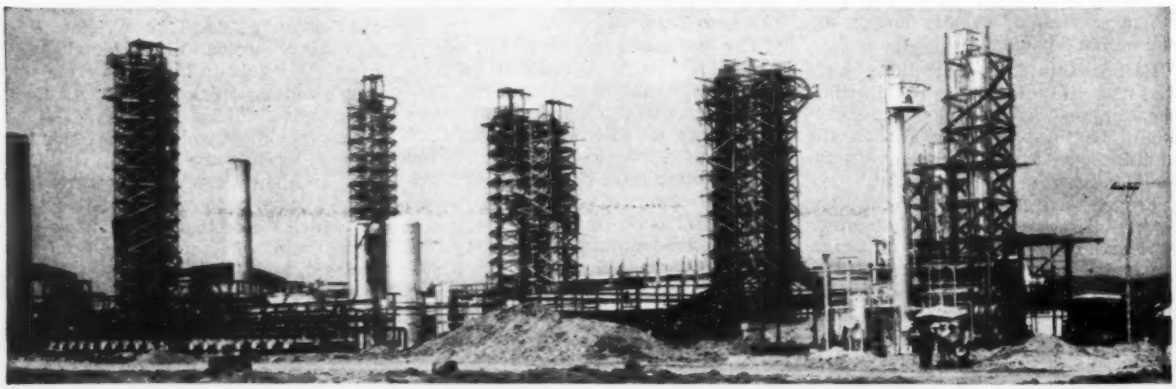
What is the present status of the Mexican oil industry, now 8½ years under government operation? This article provides some of the answers to that question, insofar as refineries and pipe lines are concerned. Material for this second article resulted from a tour of principal Mexican oil centers made in September and October by O. B. Irizarry, editor of Petroleo Interamericano, Spanish-English publication of the Petroleum Publishing Co., and Wayne Rives, advertising manager of The Oil and Gas Journal. The work of the Mexican Government oil administration in exploration and production was treated in the first article, page 42, the Journal, November 2.

The Atzcapotzalco refinery draws its crude from a 140-mile pipe line leading from the coastal Poza Rica field through subtropical jungle terrain and up rugged mountain ridges to the plain of Mexico City. The principal improvement made by Pemex in the Mexican oil-transportation system has been in expanding of the capacity of this spectacular crude line to meet added requirements at Atzcapotzalco.

Pemex is planning two major pipeline projects which, when completed, will add 225 miles to the oil transportation system. Some right-of-way has been cleared for the construction of a 70-mile branch from the Poza Rica-Atzcapotzalco line which will feed a proposed new refinery at Salamanca in the State of Guanajuato.

Site for the Salamanca refinery has been chosen, though no construction has yet started on the plant or the

Construction on a new absorption plant at Poza Rica



MEXICAN REFINERIES

Name and location—	1937 capacity (bbl. daily)	Present capacity (bbl. daily)	Type
Ciudad Madero, Tampico	43,000	57,000	complete
Arbol Grande, Tampico	11,500	23,000	complete
Mata Redonda, Tampico	8,000	13,400	topping and cracking
Bella Vista, Tampico	1,400	1,400	topping
Poza Rica, Poza Rica	8,000	8,000	topping
Minatitlan, Minatitlan	27,000	28,000	complete
Atzcapotzalco, Mexico City	11,000	23,000	complete
Total	109,900	153,800	

branch pipe line. Efrain Buenrostro, Pemex general manager, visited the United States a few weeks ago and submitted the project to American engineering firms for study. Original plans for the Salamanca refinery called for dismantling the Bella Vista and Mata Redonda refineries in the Tampico area and using much of this equipment.

The branch pipe line is planned to start from a junction with the Poza Rica-Atzcapotzalco line near Berastain about 70 miles southeast of Poza Rica and extend northeast across the states of Hidalgo and Queretaro.

The second project projected by Pemex consists of a 155-mile line across the Isthmus of Tehuantepec from the Minatitlan refinery to Salina Cruz Bay on the Pacific Coast. However, definite plans for the Salina Cruz and the Salamanca projects will be deferred until after the Aleman administration takes over and the future policies of Pemex are clarified.

Work on other Mexican pipe lines by Pemex since expropriation has been confined to regular maintenance and repair. These lines are those serving Gulf Coast fields.

The same difficulties and obstacles that Pemex engineers and executives have encountered in exploration and production also have hampered their efforts to modernize and revamp the republic's refining industry and pipeline system, namely, high labor costs, inability to obtain new equipment for urgently needed replacements as a result of hostility of the expropriated companies and dislocations brought about by World War II, the impossibility of raising the price of refined products in the face of rising costs, and the inadequacy of transportation facilities made more critical by a 45 per cent increase since expropriation in the local demand for petroleum products.

Of the equipment taken over in 1938, the refineries particularly were in need of repair and modernization. Most of the plants expropriated already had been amortized by the operating companies and had not been reconditioned since their installation years before. Sensing the future, the private companies had deferred improvements in view of the uncertain political outlook.

The major goal of Mexico's government industry has been a production and refining capacity sufficient to meet domestic needs and the projected future industrialization of the country. This program has involved shifting the emphasis in the oil industry from exports to domestic consumption.

The war and a subsequent priority from the United States to Mexico for refinery equipment gave Pemex a new incentive as well as means to carry out expansion of the Atzcapotzalco refinery. It was considered imperative that Mexico meet its own needs for petroleum products, provide emergency refining capacity and be able to fuel transient U. S. planes. The U. S. Government gave Mexico the same priority for equipment as

allowed U. S. war plants and made funds available through the Export-Import bank.

The Atzcapotzalco refinery was built originally for the processing of a variety of odd fractions and residue processed in plants in the Tampico area or collected along the pipe line.

When the latest improvements are completed next January, the refinery will be able to meet all needs of markets in central Mexico. Products include a high-grade aviation gasoline. The work carried out by Pemex consists of the following:

A 23,500-bbl. daily capacity topping plant.

A gas-fractionating plant for the production of isobutane, butane, and isopentane.

A Dubbs cracking unit with a 13,000-bbl. daily capacity.

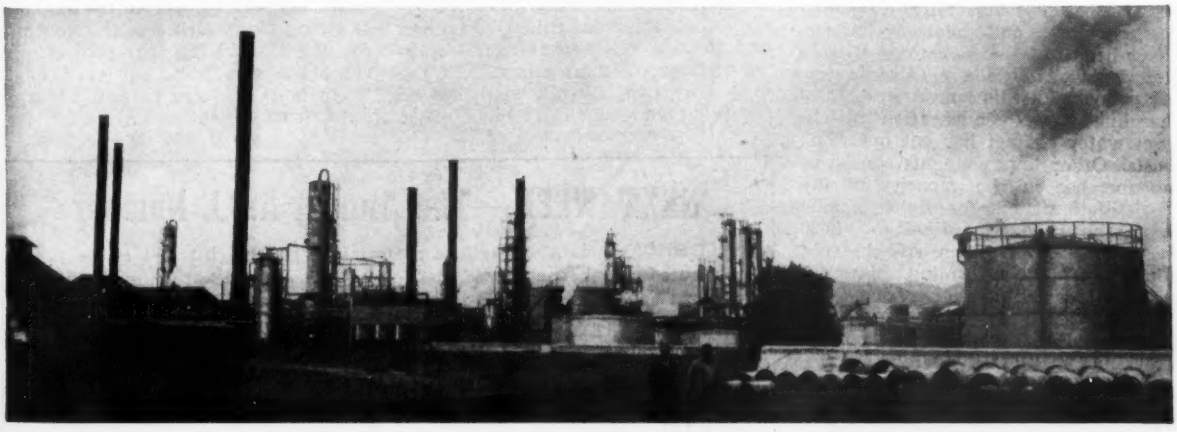
A plant for the isomerization of normal butane with a productive capacity of 500 bbl. of isobutane per day.

An alkylation plant with a productive capacity of 800 to 850 bbl. of alkylate daily.

Auxiliary units, including three new boilers, two turbo generators of 5,000 kw. each, and a water-cooling tower, will provide the necessary services to both old and new portions of the refinery.

The original Poza Rica-Atzcapotzalco pipe line was constructed in 1930 by Martin Construction Co. for Aguila. The line climbs from near sea level to an altitude of 7,358 ft. at its terminus. It originally had seven pumping stations. The line is 10-in. except for short stretches on each end which are 12-in. The terrain is so steep that Station 2 can be seen from Station 3 almost directly below.

To meet the greater needs for crude at Atzcapotzalco, Pemex in



At Atzcapotzalco, near Mexico City. The old refinery is shown in the foreground, and the new plant in the background

1941 dismantled the No. 1 station at Palmasola and installed its two pumps, plus four new units, in the six remaining stations. This move increased the capacity of the line by a third.

Another enlargement was undertaken in the latter part of 1945 with materials and technical assistance provided by the U. S. Government. Three new modern pumping stations were added, one near Poza Rica and the other two between Station 7 and Atzcapotzalco. Modifications made to the other six existing original stations actually represented conversion of these stations into new units. Pemex was thus able to enlarge the line's capacity without changing the pipe which has withstood the increased pressure of 800 psi. without indications of failure. The three new stations added last year have increased the capacity of the line to more than 43,500 bbl. per day.

Mexico has six other refineries worthy of mention besides Atzcapotzalco. One of these is at Bella Vista in the Tampico region. This plant was operated to Petromex, the original Mexican Government oil company, before expropriation. No significant changes have been made in this 1,400-bbl. daily capacity topping unit.

All the remaining five refineries were acquired under the expropriation decree. Four of them also are in the Tampico region, including one at Poza Rica, and the fifth, Minatitlan, is in the Isthmus area. The Poza Rica refinery has not been substantially altered since 1938.

Ciudad Madero Plant

The second largest refinery in Mexico is the Ciudad Madero plant. Here, Pemex has made additions and improvement to raise the topping capacity to 57,000 bbl. daily. New towers, heaters, and heat exchangers have been installed to convert the old topping units into a modern system of primary distillation. A system of gasoline vapor condensation by direct water contact has cut operating costs. Other improvements consist of an increase in the capacity of the redistillation unit for light residue from the Poza Rica field to 17,000 bbl. daily; conversion of the old Dubbs gasoline-reforming plant of 4,800-bbl. capacity into a gas and oil-cracking plant for high-octane gasoline; installation of a heavy residue cracking unit; and addition of an 8,000-bbl. daily capacity stabilizing plant which normally treats light gasolines to produce liquefied gas.

At Arbol Grande in the Tampico region, Pemex has increased by daily topping capacity of this refinery from 11,500 bbl. daily in 1937 to 23,000 bbl. Production now includes lubricants, greases, and blown asphalt. Pemex has built an entomological laboratory to study the quality of insecticides produced.

The third refinery in the Tampico region is that at Mata Redonda. Pemex officials consider that this plant was the poorest of those built prior to expropriation. Installations consisted of old-fashioned, corroded, and nearly obsolete equipment. However, topping capacity of this plant has been boosted to 13,400 bbl. daily from the 8,000 bbl. total in 1937. The refinery also is now able to produce 1,000 bbl. daily of high-octane gasoline. It is using heavy fractions from Poza Rica field as charge stock for the Kellogg unit instead of the highly corrosive crude from Naranjos field.

In the Isthmus area, Pemex on expropriation came into possession of the Minatitlan refinery consisting largely of an old Trumble unit built in 1922. Since 1938, one topping unit has been completely remodeled, and the operation of the high-vacuum plant, with a capacity of 6,000 bbl. residue daily, has been maintained at a level high enough to produce most of the lubricants used in the country.

Oil Council Proposed by Colombian Minister

BOGOTA.—Establishment of a four-member Consejo Nacional de Petroleos (National Petroleum Council) within Colombia's Ministry of Petroleum has been called for by Petroleum Minister Dr. L. Buenahora. Buenahora would preside with voice and vote.

The four other members would be named—one each—by the Senate, the House, the Supreme Court, and the Government. To be eligible, the bill states, a member must have no business connection whatsoever with the oil industry, but must be a recognized authority in either economics and finance, oil legislation, oil engineering, or oil management. At the most only two lawyers would be on the five-man council. Term of office would be 4 years with a monthly salary of 1,500 pesos (about $856.)

As its primary objective, this proposed council would make a thorough study of the oil bill now pending before the Senate and submit recommendations at the next session of Congress.

Meanwhile, Buenahora has been holding conferences with the Senate sub-oil committee which is charged with the study of the oil bill. The subcommittee's report probably will be made shortly to the full committee.

The creation of the National Petroleum Council reportedly has a good chance of approval at this session of Congress which is due to adjourn December 14.

Little Change Shown in Creole's September Output

NEW YORK. — Creole Petroleum Corp.'s Venezuelan crude-oil production in September of 581,539 bbl. daily was substantially the same as the daily average in August of 581,519 bbl.

September's 581,539 bbl. total shows that 427,531 bbl. came from the Lake Maracaibo area and Cumarebo with the remaining 154,008 bbl. daily from Eastern Venezuela.

Refinery runs in September were up to 72,267 bbl. daily compared with 58,504 bbl. daily in August. Of the 72,267 bbl. total, 61,357 bbl. daily were refined at Caripito and the remaining 10,910 bbl. daily at La Salina.

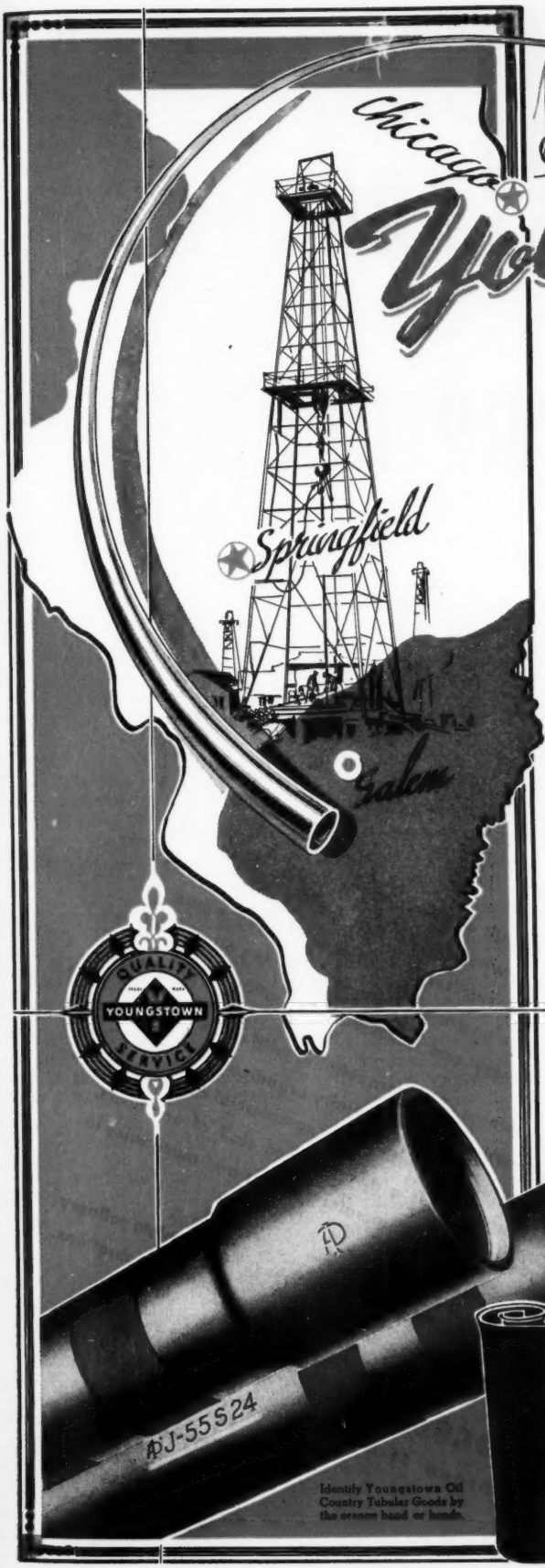
Bolivian Project May Be Extended to Cochabama

Engineers of Yacimiento Petroles Fiscales Bolivianos, the Bolivian oil administration, are studying the possibility of extending the Camiri pool-Tin Tin 225-mile 6-in. products line to the city of Cochabama in order that deliveries may be made more readily to all parts of Bolivia.

More than two-thirds of the surveying and half of the right-of-way work has been completed by Williams Brothers Co. which has the contract for the Camiri-Tin Tin project. To reach the area being surveyed, engineers must traverse part of Chile or enter from Argentina.

NEXT WEEK—The Annual A.P.I. Number

TECHNICAL data as well as material of general interest to be presented at the twenty-sixth annual American Petroleum Institute next week in Chicago will appear in The Oil and Gas Journal's annual A.P.I. issue to be published November 16. The 358-page issue will contain a 60-page editorial section devoted solely to A.P.I. papers. In addition, other news from the convention will be reported in the regular news section of the Journal's November 16 issue. The preliminary program for the meeting was carried in the Journal's issue of October 19, page 103.



Youngstown to Illinois

ILLINOIS is one of the most active oil regions, even though 1941 saw the end of its greatest drilling boom. It tops the list in number of wildcat wells projected for this year, well ahead of North Texas, the most active wildcatting area of that great oil state.

The oil strength of Illinois lies in its many scattered pools. Proven reserves increased a good ten percent last year--up to nearly 360 million barrels, which is more crude than is produced annually in Soviet Russia, or all the rest of Europe, or Asia. Ranking eighth among the states in total proven reserves and sixth in 1945 crude production and sixth in all-time production, Illinois will continue as one of America's important petroleum sources for years to come.

Ever since Illinois' oil industry really got under way in 1905, Youngstown has been a major supplier of drill pipe, casing, tubing and line pipe. Operators here, as in every other oil producing area in the world, have learned through experience to recognize the orange bands on Youngstown pipe as the mark of quality and dependability.

Location circled indicates Continental Supply Company store.

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New Pennsylvania Oil Finds Predicted at Conference

STATE COLLEGE, Pa. — Broad wildcat drilling campaigns to satisfy the heavy demand for natural gas in the eastern area also will uncover additional Pennsylvania Grade oil fields, D. T. Ring, Columbus, Ohio, president of the Pennsylvania Grade Crude Oil Association, predicted at the tenth annual secondary-recovery conference here last week. One hundred thirty-five oil operators and technologists attended.

Ring based his optimistic outlook for the Pennsylvania Grade region on a combination of research and technological development plus exploratory drilling. West Virginia and Southeast Ohio hold great promise as sources of new Pennsylvania Grade oil, Ring declared. He predicted that oil operators will devote more and more attention to the southern portion of the region, contending it may yield many "vest-pocket editions" of Bradford field.

"The challenge of decreasing production in Pennsylvania Grade oil will be met," he said. He cited various activities throughout the region directed to this end and called attention to excess of production over Pennsylvania Grade crude runs to stills for the tenth time in an 11-week period.

Digests of technical papers presented at the Pennsylvania State College secondary-recovery conference were published in The Oil and Gas Journal. November 2, page 85.

E. G. Dahlgren, assistant secretary of the Interstate Oil Compact Commission, voiced gratification of the Compact Commission at support accorded in the Pennsylvania region. He urged the necessity of development of secondary-recovery oil resources and asked cooperation in the Compact Commission's plans to develop information on secondary-recovery projects throughout the country.

At the conference considerable interest was aroused by a paper given by K. W. Smith of the college staff in which he discussed possible use in oil-producing operations of a semi-permeable diaphragm which might be made to exclude the drive fluid from a producing well while allowing the oil to enter. Presence of an oil-wet diaphragm at the well bore would be required, he said.

November Allowables Set by Three States

ANOTHER increase in allowable has been approved by Louisiana Department of Conservation. The November total in the allowable schedule is 440,000 bbl. daily with net estimated underage of 35,000 bbl. daily, leaving an allowed crude production of 405,000 bbl. daily. Original October allowable for Louisiana was 435,890 bbl. daily.

The Oklahoma Corporation Commission last week set November crude-oil production at 362,825 bbl. daily, compared with actual production of 357,473 bbl. in September, and a Bureau of Mines forecast of 383,000 bbl. daily for November.

The Bureau of Mines forecast, though not quite complete early this week, listed total U. S. demand for November at 4,730,000 bbl. daily.

The Arkansas Oil and Gas Commission announced daily allowable production for November from the state's 30 oil fields at 77,000 bbl., a decrease of 3,284 bbl. daily from the October allowable of 80,284 bbl. daily.

Oil Companies Announce Three Research Projects

Three research projects—an agricultural experimental farm, a fuel-oil laboratory, and a study of petroleum-derived waterproofing — have been announced by oil companies.

Gulf Oil Corp.'s new fuel-oil laboratory, one of the nation's largest, was opened last week near Philadelphia, and officials of the corporation forecast an increase of at least 50 per cent in home heating by oil by 1950. The laboratory will deal with problems of increasing efficiency, adapting fuels of new cracking processes to burner operation, and assisting in the development of better fuels.

The new experimental farm, to be operated by the college of agriculture of Ohio State University near Columbus, Ohio, is the result of joint plans of H. F. Sinclair, president of Sinclair Refining Co., and John F. Cunningham, dean of the college. It will include service buildings, garage, and shops and is designed to solve problems of agriculture and mechanization confronting the farmers of Ohio and the Corn Belt.

The University of Colorado will be the site of a research project for the study of waterproofing of mortar and concrete by use of petroleum derivatives which has been established by The Texas Co. Warren Raeder and William H. Thoman, professors of the university, will supervise the project.

Canada's August Crude Output Drops Slightly

OTTAWA. — Canadian crude-oil production, which has been at a substantially lower level than during the war, registered another slight decline in August.

The Dominion Bureau of Statistics reported production in August totaling 623,287 bbl. (35 gal. per barrel), a daily average of 20,106 bbl. Production in July was 634,695 bbl. for a daily average of 20,474 bbl.; and in August 1945, 685,030 bbl., for a daily average of 22,098 bbl. Production of 476,770 bbl. in August 1946, from limestone oil wells in Turner Valley, Alberta, accounted for most of the production.

Natural-gas production in Canada during August amounted to 3,270,833,000 cu. ft., compared with 3,183,855,000 cu. ft. in July. Natural-gas output in August 1945 was 3,348,063,000 cu. ft. Alberta produced 2,837,070,000 cu. ft. of the August total.

Crude Exports, Imports Show Gain in August

WASHINGTON. — An increase in both exports and imports of crude petroleum during August, an increase in exports of motor fuel, gasoline, and lubricating oil, and a sharp drop in both exports and imports of gas and fuel oil, were disclosed last week in a Department of Commerce report on foreign trade.

Details are shown in the following table:

	August	Daily average	July	Daily average
EXPORTS (1,000 BBL.)				
Crude oil	4,602	148	4,291	138
Gas and fuel oil	3,036	97	3,118	100
Motor fuel and gasoline	3,210	103	2,055	66
Lubricating oil	1,548	49	1,336	43
IMPORTS (1,000 BBL.)				
Crude oil	7,631	246	7,575	212
Gas and Fuel oil	4,946	159	6,170	199

LOOKING

for a way ... TO STOP

CHICAGO BRIDGE & IRON COMPANY EVAPORATION-PREVENTION DEVICES

HORTON DOUBLE-DECK FLOATING ROOF . . . for use on flat-bottom tanks to stop evaporation losses and to reduce fire hazard.

HORTON VAPORSPHERE . . . used in connection with fixed-roof tanks storing crude oil or gasoline to prevent evaporation.

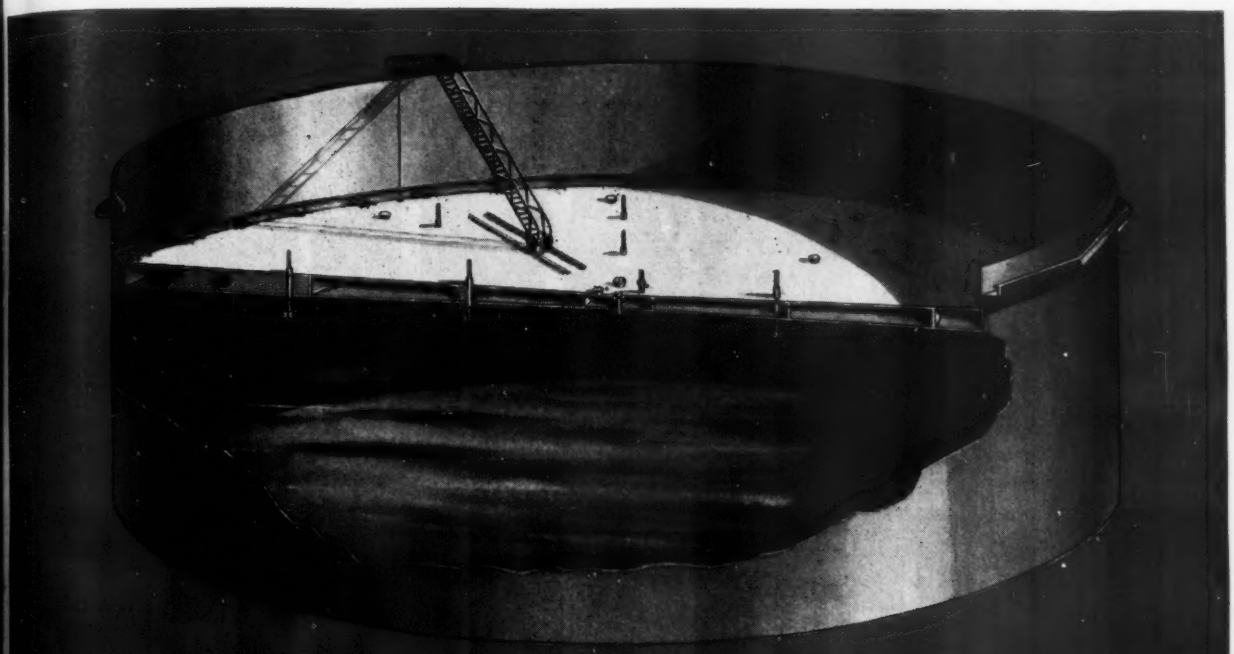
HORTONSPHERES . . . for storing volatile liquids and gases.

HORTONSPHEROIDS . . . for storing moderately volatile products.

HEMISPHEROIDS . . . for storing volatile products that are only slightly volatile.

the VAPORSPHERE!

The Horton Vaporsphere is used in connection with one or more fixed-roof storage tanks, to prevent evaporation losses caused by *breathing*. It is connected to the tanks by vapor lines. When the contents of the air-vapor space in the tanks expand, the excess vapor flows into the Vaporsphere. When the conditions which caused the vapor to flow into the Vaporsphere are reversed, the vapor returns to the tank. Thus, since the vapors do not leave the "system," there is no evaporation loss. The Vaporsphere also takes care of a portion of the air-vapor mixture displaced from the tanks by unbalanced filling.



EVAPORATION LOSSES ?

Here is your answer!

THE HORTON DOUBLE-DECK FLOATING ROOF

The steps you take to prevent evaporation losses that occur daily during the storage of volatile liquids materially affect your profits at the end of the year. Many oil companies are using Horton Double-Deck Floating Roofs as efficient "stoppers" of evaporation losses on flat-bottom tanks storing volatile liquids that do not boil at normal temperature.

In addition to stopping all evaporation losses due to filling and practically all standing storage losses, the Horton Double-Deck Floating Roof eliminates fire hazard and decreases corrosion. It is particularly recommended for *working* tanks that are filled and emptied more than six times a year, tanks in blending service and tanks storing sour crude oils or other corrosive products. Tanks with floating roofs are widely used at refineries, pipe line stations, natural gasoline plants, tank farms and bulk stations.

The Horton Double-Deck Floating Roof is one of a complete line of products we build for the petroleum industry for preventing evaporation losses. The others are described briefly on the opposite page. Write our nearest office for further details.

CHICAGO BRIDGE & IRON COMPANY

Chicago, 4	2128 McCormick Building
New York, 6	3347-165 Broadway Building
Cleveland, 15	2204 Guildhall Building
Los Angeles, 14	1423 Wm. Fox Building
Atlanta, 3	2154 Healey Building
Birmingham, 1	1536 North 50th Street
Tulsa, 3	1606 Hunt Building
Houston, 1	5619 Clinton Drive
Philadelphia, 3	1615-1700 Walnut Street Building
Washington, 4	703 Atlantic Building
San Francisco, 11	1254-22 Battery Street Building
Detroit, 26	1514 Lafayette Building

Plants in BIRMINGHAM, CHICAGO and GREENVILLE, PENNA.

In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.

PERMANENT RESILIENCE

Resilient parts made from HYCAR synthetic rubber *stay* resilient. That's partly because of HYCAR's unusual chemical stability—its resistance to oil and gas, acids and most other chemicals. And parts made from HYCAR are extremely resistant to the effects of oxidation, sunlight, and normal aging. A HYCAR sealing ring, for example, will maintain a positive seal through years of service even when constantly exposed to oils and acids inside the pipe, and sunlight and salt air outside.

Other unusual and valuable properties are listed in the box at the right. But most important, these properties may be had in an almost limitless number of combinations, each designed to meet the specific service conditions of the finished part. Parts made from HYCAR have seen service in *every* industry, giving long life, dependability, and economical operation.

That's why we say ask your supplier for parts made from HYCAR. Test them in your own applications, difficult or routine. You'll learn for yourself that it's wise to use HYCAR for long-time, dependable performance. For more information, please write Dept. HK-12 B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

WHAT HYCAR DOES IN OIL FIELD APPLICATIONS

1. *Resists oil and gas—even under high pressures and temperatures.*
2. *Resists action of abrasive-laden fluid under high pressure and at high velocity.*
3. *Wears at slow rate even under worst conditions.*
4. *Makes a positive, leak-proof seal, even after a long period of service.*
5. *Provides high elasticity.*
6. *Gives high tensile strength.*
7. *Has minimum tendency to cold flow and compression set.*

Hycar

Reg. U.S. Pat. Off.

LARGEST PRIVATELY PRODUCED BUTADIENE TYPE

American Rubber

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

WASHINGTON WATCHING

BY HENRY D. RALPH

Public-Domain Leasing

WASHINGTON.—The new oil and gas leasing regulations published in the Federal Register of November 1 go a long way toward increasing activity on the public domain, but they do not solve all problems of operators on government-owned lands.

For one thing they do not apply to Indian lands, lands under the jurisdiction of the Department of Agriculture or other federal agencies outside of the Bureau of Land Management, government lands acquired by gift, purchase or condemnation, nor such special reservations as national parks and Naval oil and shale reserves. Such government lands, not technically part of the public domain, total up to large acreage, and quite a few of the parcels overlie oil or gas deposits.

Another problem was raised by Oscar L. Chapman, undersecretary of the interior, in a detailed discussion of the new regulations before the mineral section of the American Bar Association last week, when he said:

"It is necessary that the states which will benefit most from this measure should enact laws which will insure the efficient production of the oil and gas which have already been found and that which it is hoped will be found. With one exception these states have not enacted such laws. It will take legislation by these states to apply uniformly the principles of engineering control which are necessary to prevent waste and to increase the ultimate recovery of oil."

In spite of the simplified administrative procedure embodied in the new regulations, there are a number of difficult problems of application. One of the largest is the provision giving a flat 12½ per cent royalty to all noncompetitive leases previously issued covering lands which were not within the productive limits of a producing oil or gas deposit on August 8, 1946. The BLM has decided it would be too big a task to make such a determination for every field, so it will shift as much of the work as possible to the operators and plans to make determinations of the limits of producing fields only on the specific request of a lessee.

Tank-Car Pooling Plan

A REQUEST that the principal users of pressure tank cars pool their equipment and exchange products so as to eliminate cross-hauling and make more efficient use of available cars has been made by the Civilian Production Administration. Immunity from prosecution under the antitrust laws has been assured by a certificate approved by the Department of Justice.

The request is directed to shippers of anhydrous ammonia, liquefied petroleum gas, and chlorine, and is in effect a revival of the wartime pooling requirement. Shippers are expected to make such purchases, sales, exchanges, and loans of products and to arrange for such common use of cars and storage facilities as may be necessary to obtain the most efficient use of pressure cars. All plans must be reported in detail to CPA, which reserves the right of review to see that shippers, distributors, and consumers are treated equitably.

This program may have little effect on L.P.G. shippers because virtually all the cross-hauling was eliminated during the war, and movement of liquefied gas is pretty much in a single direction and on the shortest route from production points to principal markets. However, it is expected to reduce considerable cross-hauling of ammonia and chlorine, and it could reduce the demand of these industries for additional pressure cars by upwards of 100 cars. If this result is achieved it will mean that more of the new cars now under construction can be allotted to the L.P.G. industry during the next few months.

There is now a growing prospect that the fertilizer and chemical industries can get through the winter with considerably fewer additional cars than they first demanded, which means that the L.P.G. industry may be able to retain the rest of the government-owned pressure cars it is now using and will get a larger share of new-car production. This is particularly important because the fittings on a car must be changed when it is converted from one type of service to another, involving not only expense but delay, and if the new cars can be scheduled for L.P.G. use while still in the factory, they can be equipped with the proper fittings before delivery.

Mishandling the Facts

A "WORLD-WIDE emergency shortage of oil" was cited by the U. S. Maritime Commission last week as its reason for taking 35 large tankers out of its reserve fleet and asking oil companies to operate them for government account.

Inquiry developed that this is in the nature of a "scare head." The shortage is not of oil but of transportation, is not emergency but has been developing for some time, and is not worldwide but chiefly European.

The 35 tankers, chiefly of the T-2 type available for sale as surplus, will be added to the fleet now being operated by the Maritime Commission to serve the Army and Navy and to complete the delivery commitments of UNRRA and other government programs. The American occupation forces in Europe will require more petroleum during the winter months, French refineries are being rehabilitated and need crude, British import requirements are rising, and this Government still has commitments to supply certain quantities to Italy and other devastated nations. This all adds up to need for more tankers during the winter months, and private operators have not been disposed to purchase sufficient surplus vessels to fill the immediate demand.

It is understood that the largest single assignment of these additional tankers will be the movement of Middle East crude to European refineries.

OPA on Chemicals

THE price decontrol movement has belatedly got around to petroleum chemicals, which Congress intended to free from control last summer when it exempted petroleum and all of its products. The Office of Price Administration has now issued an interpretation, retroactive to July 1, removing price ceilings from all chemicals which are manufactured from petroleum if 50 per cent of the nation's output is produced by petroleum refiners.

Officials explained that the delay was because OPA could not find a good definition of a petroleum refiner, but it finally cut this Gordian knot by accepting the list of "North American operating refineries" published in the refinery number of The Oil and Gas Journal, March 30, 1946. Under the new interpretation chemicals manufactured by companies in this list are considered to be petroleum products and therefore free of price controls.

A good many of these products are chemically identical with products of fermentation or coal-tar distillation, which causes the anomalous situation that as long as the other chemicals stay under control, one can of ethyl

alcohol, for example, is under price ceiling while the next can is free of control.

Co-op Tax Benefits for All?

THE National Association of Cooperatives has grabbed the ball and is asking the Bureau of Internal Revenue to revise the regulations regarding taxation of co-ops. Apparently this is an attempt to forestall congressional action to end the co-ops' tax privileges, because the N.A.C. says the law is all right but the regulations are outmoded.

The association says co-ops don't need tax advantages in order to grow and that most of them don't want special exemptions. Instead they want to give other types of business the same privilege co-ops have of distributing earnings tax free, and they are also willing to have the regulations tightened up to stop instances of tax avoidance by some co-ops.

The N.A.C. is proposing changes in the regulations to (1) recognize that all forms of business have an equal right to deduct patronage refunds owing and paid to customers from their gross incomes in computing their income taxes; (2) deny tax immunity as to funds allegedly owing to customers if actually retained in the business without the customer's authorization; (3) limit the tax-free incomes of those farmer cooperatives now exempted to the amounts actually paid out as dividends to stockholders at the specially limited rates set up in the law; and (4) require all cooperatives to file information returns each year, reporting each patronage refund of $100 or more.

Preventive Discussions

AN invitation to business men to discuss the application of the antitrust laws prior to adopting a contemplated course of action was extended by Attorney General Tom C. Clark in addressing the Associated Industries of Massachusetts.

"We know that because of the broad language of the Sherman Act, violation of its terms is sometimes unpredictable although the Supreme Court is making clearer and clearer the bounds of proper activity," the attorney general said. "Nevertheless, should a specific program be contemplated and should the planners be fearful that it violates the law, the Department of Justice is prepared to discuss it.

"The American business man who wants to play the game according to American rules has nothing to fear."

This policy of advance consultation on the application of the antitrust laws has been an on-again-off-again matter with the Department of Justice for many years. It appeared to be off-again when the National Petroleum Council tried to get advance approval for some of the things it might want to do. Now Clark indicates it is on-again, though he didn't elaborate on the extent or method of operation.

Several years ago advance consultation got the department into some embarrassing situations. In some instances the department brought suit against practices which the defendants claimed had earlier been approved, for it developed that the plan had not worked out in practice exactly the way it had been presented on paper.

At any rate, there is only a very limited field for advance consultation, since only border-line cases can be considered and the department can't grant immunity from prosecution of any of the many practices which the courts have held violate the act.

Pennsylvania Properties Involved in Three Sales

Three oil transactions taking place recently along the New York-Pennsylvania state line saw 39 producing wells change hands. At Bolivar, N. Y., Tress Oil Co. sold 27 producing wells, located in the township, to Gordon Smith, Eldred, Pa. Mark B. Hyslip, Wellsville, Pa., purchased the Nelly Phillips oil property, comprised of 12 wells on 76 acres, from Charles Phillips. The property is located near Nile, Pa.

The newly formed Mac Penn Oil Co. purchased 2,000 acres of oil lands, located in Allegheny and Oil Creek townships of Pennsylvania, from executors of the estate of the late Willis E. Fertig. Production from the properties is reported about 45 bbl. daily.

New Depth Records Set In Oklahoma, Mississippi

Superior Oil Co. of California has established a new depth record in Oklahoma with its 51-11 Weller, a wildcat in NW NW NE 11-8n-12w, 5½ miles north of Fort Cobb in Caddo County. At week's end crews were drilling ahead at 14,651 ft., 69 ft. below the former record of 14,582 ft. established in 1939 by the Continental Oil Co. 1 Proctor, C NW 28-10n-20w.

The Weller test is being drilled as a tight hole, although it is reported that several good oil and gas shows have been passed. Superior plans to carry the well on down to below 15,000 ft., possibly to 17,000 ft. if tools can be found which will withstand the great loads imposed at such depths.

In Mississippi, the Superior Oil Co.'s Forrest County wildcat, the 1 Cassie Bradford, 1-3n-13w, preparing to test at 15,683 ft., has set the depth record for that state. The record here was previously held by The California Co. on a well drilled to 12,800 ft. in Brookhaven field.

The Pacific Western Oil Corp. 1 National Royalties, 5-26s-22e, Kern County, California, was last reported drilling at 16,025 ft., about 220 ft. short of the California drilling depth record established in 1945 by Standard Oil Co. 20-13 KCL, in the Coles Levee field, which was carried to 16,246 ft.

I.P.A.A. Votes Oil-Policy Statement

(Continued from page 38)

elected for his second term as I.P.A.A. president. Others re-elected were H. B. Fell, executive vice president; Russell B. Brown, general counsel; C. E. Buchner, executive manager, and N. T. Gilbert, treasurer. State vice presidents and members of the executive committee, many of whom were reelected, are:

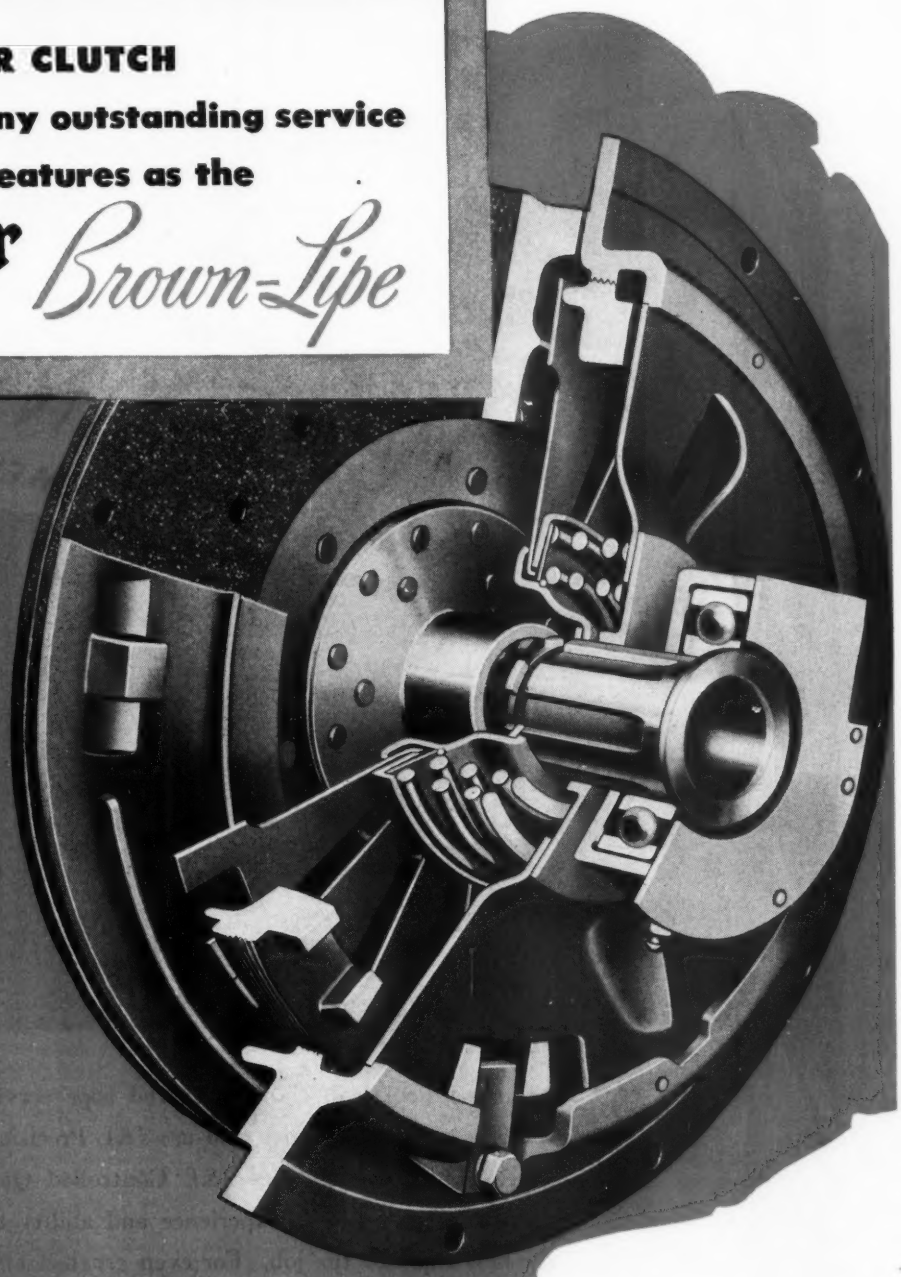
Executive committee: W. C. Whaley, Merle Becker, Emery Carper, James Donoghue, Jake L. Hamon, A. E. Herrmann, James P. Evans, Sr., C. P. McGaha, J. C. Miller, J. Ed Warren, R. F. Morgan, A. S. Ritchie, H. J. Porter, Fred W. Shield, W. I. Lewis, Charles W. Teater, J. D. Trimble, and W. M. Vaughey.

State vice presidents: J. E. Berry, Arkansas; C. A. Johnson, California (Southern); A. J. Crites, California (Northern); Warwick M. Downing, Colorado; Leo V. Horton, Illinois; A. J. Walker, Indiana; George H. Bruce, Kansas; K. Z. Wilking, Kentucky; W. C. Woolf, Louisiana (North); William Helis, Jr., Louisiana (South); I. W. Hartman, Michigan; Thomas A. Jirik, Minnesota; E. B. McGehee, Mississippi; O. G. Bitler, Missouri; L. R. Hannah, Montana; Bert Aston, New Mexico; John M. Lovejoy, New York (East); George W. Holbrook, New York (West); D. T. Ring, Ohio; J. Garfield Buell, Oklahoma (Eastern); Dr. Waldo Stephens, Oklahoma (Western); Lynn G. Smith, Pennsylvania; Dilworth S. Hager, Texas (Northeast); Harold G. Neely, Texas (Northwest); Noble Ginther, Texas (Southeast); Maston Nixon, Texas (Southwest); W. S. Hallanan, West Virginia; E. J. Sullivan, Wyoming.

West Texas Property Sold

BARTLESVILLE, Okla. — Cities Service Oil Co. (Del.) has announced the purchase of the Tevis F. Morrow et al properties located in Slaughter pool, Hockley County, West Texas. The properties consist of 3,563 producing acres on which 92 wells have been drilled. Gross production is 3,050 bbl. per producing day and 2,100 bbl. per average calendar day.

NO OTHER CLUTCH has so many outstanding service features as the Spicer Brown-Lipe



UNIFORM OVERALL PRESSURE
Uniform pressure through 360° of pressure plate, without variation.

SIMPLE ADJUSTMENT
Adjustment can be made in a few minutes without special tools.

LONGER BEARING LIFE
Release bearing revolves without load except when in use; ball bearing very much oversize and completely protected against dirt; outlasts most other bearings on vehicle.

NON-WARPING PRESSURE PLATE
Highest grade materials,—for example, the non-warping heat treated alloy pressure plate.

SMOOTH
Flexibility of the levers results in smooth pick-up, with high safety factors against slipping. Assures longer life of units from crankshaft to axle-shafts.

NO CHATTER
Low and non-varying internal friction avoids "chatter".

LOW PEDAL PRESSURE
Pedal pressure can be kept low because spring length remains essentially constant throughout life of clutch; there is no high internal friction to overcome on release movement; double plate clutch in larger capacities avoids heavy spring pressure required for large single disc clutches.

FEWER PARTS
Multiplicity of small wearing parts eliminated.

INSULATED SPRINGS
Springs are not in contact with pressure plate; heat from overheated plate cannot destroy their temper.

ECONOMICAL
Delivered as a *completely engineered unit*—it is not necessary to design or purchase special transmission front bearing caps, clutch release bearings or housings, with their attendant problems.

Spicer "Brown-Lipe" Clutches have proven their superiority in millions of miles of performance, wherever service conditions have been the most tough and gruelling. Spicer engineering and construction features offer economy and performance available in no other type of clutch. Spicer technical men will give you additional details on request.

SPICER MANUFACTURING • *Division of Dana Corporation* • **TOLEDO 1, OHIO**

42 YEARS OF Spicer SERVICE

Transmissions • Torque Converters • Passenger Car Axles • Universal Joints
Clutches • Parish Frames • Stampings • Spicer "Brown-Lipe" Gear Boxes

Your log book will show improved rope service with a resultant lower cost when you use J&L Precisionbilt Wire Lines. They are made of J&L Controlled Quality steel by men who have the experience and ability to produce the best rope for the job. For even greater service, order J&L Permaset Pre-formed Wire Lines—pre-forming gives them extra flexibility and resistance to wear.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

GILMORE WIRE ROPE DIVISION

PITTSBURGH 30, PENNSYLVANIA

J&L *Precisionbilt* PERMASET PRE-FORMED WIRE ROPE

Advent of Colder Weather Improves Heating-Oil Market

COLDER weather throughout parts of the United States this week was expected to result in an early stiffening of the burning-oil market which has been sagging for several weeks under the pressure of record heavy stocks and light consumption.

One Mid-Continent marketer reported no particular pickup in inquiries as yet but pointed out that burning-oil consumption, once it gets under way, is a "round the clock matter." Other suppliers said heating oils are beginning to move in somewhat better volume and will increase rapidly as the season advances.

Mid-Continent motor fuel appeared unchanged. Contract material moved at prevailing posted prices, while the relatively small spot-market was characterized by the efforts of the so-called price buyers who were reported obtaining housebrand gasoline a half cent or more under the prevailing 7-cent posted price.

Strong seasonal demand continued to rule in the natural-gasoline market. Some suppliers were not quoting the most sought-after 26-70 grade. Quotations were 4¾ cents Group 3, and 4¼ cents North Texas. One supplier reported one car of 26-70 available at 4 cents North Texas.

New York's burning oil market dropped as a result of the large refinery output and the unseasonably hot weather. Socony-Vacuum Oil Co., Inc., lowered the price on No. 2 fuel oil 2/10 cent a gallon (barge and tank car in New York harbor and New Jersey) making the new tank-car price 6.1 and the new barge price 6 cents per gallon. Other suppliers followed Socony-Vacuum's move, but the lower price level was expected to last only until the weather favors heavier consumption.

New York market sources reported no change in residual. However, one tanker is reported to have stayed some time in the harbor before moving its cargo of residual. New York's kerosene market was unchanged.

Spotted sales at distress price concessions were reported this week on the Pacific Coast as small refiners attempted to free storage of products backed up by continuation of the maritime strike. The few scattered sales at distress prices were not considered in sufficient volume to represent the true market, however, and prices in general were reasonably well supported at previous levels by continuing high demand for motor fuel, diesel oil and domestic heating fuels. Natural gasoline was moving in routine fashion with prices stabilized. November 1 marked opening of the so-called winter proofing campaigns by most California refinery and marketing companies, a program which invariably causes a bulge in lubricating oil and grease consumption.

Speculation continued in the Mid-Continent area over the possibility of a crude price advance. Those predicting another crude raise pointed to the energetic efforts being made in many fields to secure connections. Reports of various price concessions to East Texas producers persisted. Crude has been extremely tight in certain areas for weeks.

The Federal Power Commission reported last week that fuel oil consumption in September by electric utility power plants totaled 2,917,670 bbl. compared with 2,963,282 bbl. in August, a decrease of 1.6 per cent.

Production Pioneers to Meet

LOS ANGELES.—Petroleum Production Pioneers will hold a year-end party December 13 at the Roger Young Auditorium, Los Angeles, it was announced recently by Lou Bronzan, chairman of arrangements. The Pioneers executive committee, headed by J. E. Gosline, manager of the southern division, Standard Oil Co. of California, has adopted a project for 1947 seeking to expand membership to include all production pioneers in the state. Qualifications for membership will be explained at the December 13 meeting.

New Crude Prices Posted

Sinclair Prairie Oil Co. has posted a new crude price effective October 1 for Flour Bluff and East Flour Bluff fields of Nueces County, Texas. The new price ranges from $1.33 for oil of 20° gravity and below, with a 2-cent differential per degree of gravity, to $1.75 for oil of 40° gravity and above. Formerly a flat price of $1.68 per bbl. was posted in these fields.

East Texas Wells Sold

TYLER, Tex.—Sale of 15½ net East Texas oil wells for a reported $664,000 by O. R. Cooper of Tyler to General American Oil Co. of Dallas was announced here last week. The purchase was reported to include Cooper's interest in 26 wells, 12 in Gregg County, 10 in Kilgore townsite, and 4 in Rusk County.

DEATHS

Warren Walker, 51, in charge of partnership accounting for Sunray Oil Corp., died November 4 in Tulsa.

Ellsworth S. Nowery, retired drilling and production superintendent for the Beaumont, Tex., division of Sun Oil Co., died October 29 at his home in Beaumont. He had been in the oil business 60 years prior to his retirement in 1944, beginning as a tool dresser in 1884. A native of West Virginia, he came to Texas in 1907.

George L. Schneider, 71, died October 24 at his home in Oil City, Tex. He was a retired employe of The Texas Co., production division, in Oil City.

Earle Caldwell Emery, 71, president of the Minard Run Oil Co. and a member of the Pennsylvania Grade Crude Oil Association, died October 31 in Clearwater, Fla. A native of Bradford, Pa., he had been active in Bradford oil fields since 1919. A graduate of the Massachusetts Institute of Technology, Emery was among the first to initiate secondary recovery in Bradford fields by means of water flooding. He was a member of the Bradford Producers Association and also had extensive holdings in the west and midwest.

Lieut. E. A. Beasley, formerly with Shell Oil Co., Inc., in Midland, Tex., died recently in Japan.

R. O. Harvey, 65, independent oil operator of North Texas, died October 29 at his home in Wichita Falls, Tex.

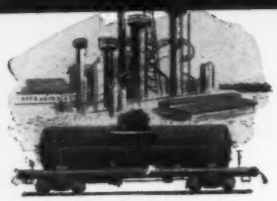
Merle F. Hampton, president of M. F. Hampton & Co., pipe-line equipment firm, was killed November 1 in an automobile accident in Kansas City, Kans.

William T. Hugo, 65, former drilling contractor and more recently associated with Link Oil Co., died October 31 in Tulsa.

George W. Williams, 65, retired drilling contractor, died November 2 in Tulsa.

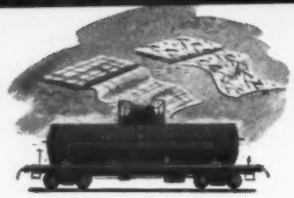
R. R. Griffin, retired vice president in charge of marine transportation of Shell Oil Co., Inc., died October 22 in Oakland, Calif. He had been with the company 25 years prior to his retirement August 1 starting as a clerk with Shell of California in 1921.

Vincent Vincent, 37, service station supervisor for Tide Water Associated Oil Co., died November 4 in Tulsa.



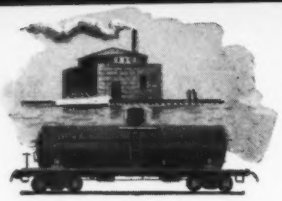
ALCOHOL

Clean, steel car, 6,000 to 10,000 gallon capacity.



CAUSTIC SODA

Heavily insulated steel car, with or without heater coils, 8,000 or 10,000 gallon capacity. Usually specially lined.



CHLORINE

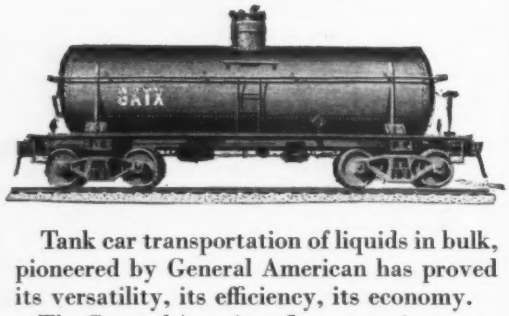
Insulated, welded car; built to withstand pressure up to 500 pounds; 15 or 30 ton capacity.

COTTONSEED OIL

Clean, steel coiled car of 8,000 gallon

FOR RENT

TANK CARS



Tank car transportation of liquids in bulk, pioneered by General American has proved its versatility, its efficiency, its economy.

The General American fleet comprises more than 37,000 specialized tank cars . . . 207 different types of tank cars . . . designed for the safe and swift hauling of an almost infinite variety of liquids.

General American's strategically located offices, plants, and repair shops keep these tank cars at your service; provide you with precisely the type of tank cars you want, *where* you want them.

If your problem is the transportation of liquids in bulk, let the nearest General American office help you.

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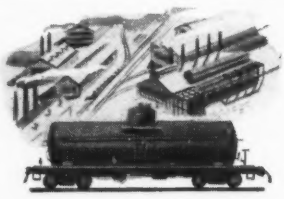
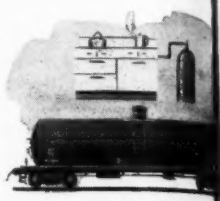
CHICAGO



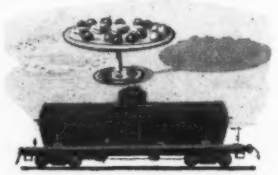
FUEL OIL

Steel car, steam coiled, 8,000 to 12,500 gallon capacity



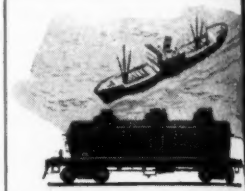
PROPANE

Heavily constructed car, welded and
Built to withstand internal pressures to 30
Capacity 10,000 to 11,000 gallons



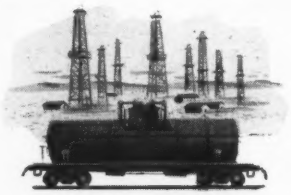
CORN SYRUP UNMIXED

Clean, steam coiled with heavy truck capacity. Usually lined with aluminum paint.



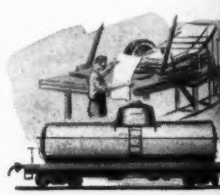
LUBRICATING OIL

Steel car, with steam coils, single or multi
partment; usually 8,000 gallon capa



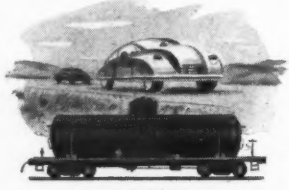
MURIATIC ACID

Car lined with pure or synthetic rubber; 8,000 to 10,000 gallon capacity.



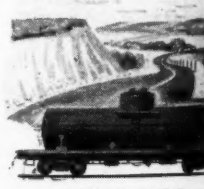
ACETIC ACID

Aluminum Car, 8,000 or 10,000 gallon



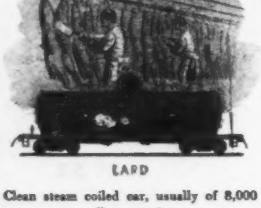
GASOLINE

Clean car, 6,000 to 12,500 gallons; single or multiple compartment.



ASPHALT OR TAR

Heavily steam coiled car; with 2 or more
insulation; steam jacketed outlet; 8,000 to
gallon capacity.

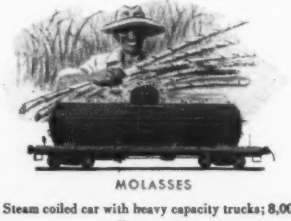


LARD

Clean steam coiled car, usually of 8,000 gallon capacity.

WINE

Insulated car with one to six compartments. Interior coated to preserve quality.



MOLASSES

Steam coiled car with heavy capacity trucks; 8,000 gallon capacity.

SULPHURIC ACID

Heavily constructed steel car with
capacity. Equipped to unload through

An Electronic Detonation Meter For Motor-Fuel Antiknock Rating

by D. R. deBoisblanc and H. M. Trimble**

1. Introduction

THE knocking characteristic of a fuel may be determined in the laboratory by comparing its tendency to knock in an engine under certain conditions to the tendency of a specific mixture of pure isooctane (2,2,4-trimethyl pentane) and pure normal heptane under the same conditions. These tests are generally made in a single-cylinder, variable-compression engine. Two laboratory procedures have been developed which are widely used to determine the octane ratings of motor fuels, the A.S.T.M. motor and the C.R.C. research methods. An integral part of both of these methods is the mechanical device known as the bouncing pin.[1] A.S.T.M. first proposed a method for comparing the knocking characteristics of fuels in 1932.[2] This first method was similar to the present research method, but the following year it was changed to A.S.T.M. motor method.[3] Both of these methods incorporated the bouncing pin in a form still permitted by the present A.S.T.M. motor method. While refinements have been made in the instrument since that time, all changes have been subjected to the criterion that no effect on the octane number values was produced. Billions of gallons of gasoline have been produced whose antiknock quality has been controlled by the A.S.T.M. motor method employing the bouncing pin, and thousands of man hours have been devoted to the problem of correlation of laboratory results and performance of the fuels in automobiles on the road.

For a number of years the research department of the Phillips Petroleum Co. has been studying the general problem of detonation detection in internal-combustion engines. It is the purpose of this article to describe an instrument which has been developed as a substitute for the bouncing pin in the A.S.T.M. and C.R.C. research test methods. It has long been the desire of those engaged in the testing of motor fuels to eliminate one of the principal causes of lost time in these methods, that is, the uncertainty in the performance of the bouncing pin.[4,5] Consequently, the aim of this development has been to produce a dependable detonation meter to eliminate a source of trouble. The instrument about to be described shows promise of being a useful addition to knock testing. At the present time a number of laboratories are engaged in a program set up to evaluate the performance characteristics of this meter. Since the results of this work will not be generally available for some time, only the data which have been obtained in our own laboratory will be reported here.

It should be remarked that when properly adjusted the bouncing pin has some very desirable features. The stability is very good and yet the time of response is less than the engine equilibrium time. The ability of the pin to repeat its ratings on a given engine is extremely good. Any instrument to displace the bouncing pin should certainly retain as many of the desirable features as possible. Consequently, the goal set was the design of a detonation meter which compared favorably with the bouncing pin on the following points: Stability, sensitivity to small differences in fuel quality, rating reproducibility, and time of response to changes in knock intensity. In addition it was felt that the instrument should be simple from an electrical viewpoint, that it should be rugged in construction, that the ratings should match the bouncing pin within the experimental limits of the test methods, and that little extra training for an operator already familiar with the test procedures should be necessary.

2. Development of an Electrical Analog of the Bouncing Pin

Since the foregoing specifications essentially called for an electrical analog of the bouncing pin, it was necessary to make a theoretical study of the latter. The electrical and mechanical behavior of the pin was studied, with the result that it was possible to derive an equivalent electrical network which embodied all the main operational features of the mechanical counterpart. For the purposes of this discussion the simplified mechanical layout shown in Fig. 1 represents the bouncing pin quite well. This assembly consists of a rod, or pin, (p) with vertical freedom only, normally in contact with an ideal diaphragm (d), the other side of which is acted upon by the gases of the cylinder. A cantilever spring (S_3) acts downward on (p).

Attached to the member (S_3) is an electrical contact. A second pair of springs (S_1 and S_2) are balanced against each other. An electrical contact is also attached to S_2. The operation is briefly as follows:

When the pin is given a certain minimum velocity upward, it leaves the diaphragm and rises until the gap (g) is closed. When g is closed, a pulse of current is sent to the indicating apparatus. All pulses are of the same amplitude, but vary in duration according to the length of time the gap remains closed each engine cycle. These pulses are averaged with respect to time and indicated on a panel meter. The average length of time the gap is closed is related to the rate of change of pressure in the cylinder. It should be noted that it is not necessary to consider the diaphragm behavior since by specifying that a certain rate of change of pressure causes a certain velocity of the pin at the time the pin leaves the diaphragm, only the effect of the spring and gap assembly need be considered. Of course, the diaphragm does affect the response of the entire system and in the quantitative analysis it was necessary to consider this. It was found that the diaphragm affects only the functional relation between the rate of change of pressure in the cylinder and the velocity of the pin at the instant of gap closure. We need not assume here that the rate of change of pressure is

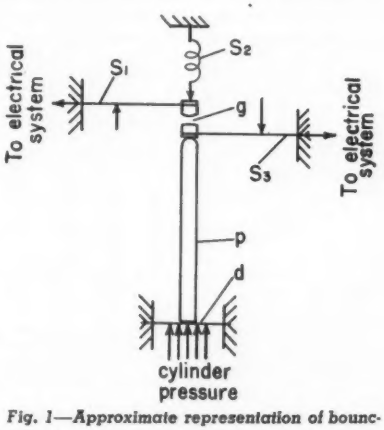


Fig. 1—Approximate representation of bouncing pin

*Phillips Petroleum Co., Bartlesville, Okla.

TABLE 1—A.S.T.M. (MOTOR) KNOCK TEST RESULTS USING THE STANDARD BOUNCING PIN AND PHILLIPS DETONATION METER

Fuel number and octane number and deviation from A.S.T.M. (Motor) guide curve

Composition—	Standard bouncing pin		Phillips detonation meter	
	Rating (octane No.)	Guide curve deviation (in.)	Rating (octane No.)	Guide curve deviation (in.)
1. 49.1% C.P. Benzene + 50.9% n-Heptane	42.8	.007	42.4	.008
2. C-13 + 2.0 ml. TEL/gal.	83.8	.008	84.2	.011
3. 70% X-3 + 30% M-4	73.6	.008	73.5	.003
4. 50% X-3 + 50% M-4 + 3.0 ml. TEL/gal.	75.6	.006	76.2	.006
5. 100% X-3	90.0	.002	89.7	.014
6. 68.4% C.P. Benzene + 31.6% C-13	86.1	.007	85.6	.008
7. 50% X-3 + 35% F-6 + 15% C-13 + 3.0 ml. TEL/gal.	94.2	.014	96.0	.004
8. 50% X-4 + 35% F-6 + 15% C-13 + 3.0 ml. TEL/gal.	96.3	.005	96.4	.040
9. Phillips "66"	73.1	.006	73.0	.002 A36
10. Phillips "66"	73.4	.003	73.0	.007 A42
11. Competitive motor fuel blend No. 1	74.3	.002	74.2	.005 A32
12. Competitive motor fuel blend No. 2	74.2	.001	74.0	.006 A34
13. Competitive motor fuel blend No. 3	77.9	.016	77.9	.010 A41
14. Competitive motor fuel blend No. 4	73.4	.003	73.3	.010 A44

linearly related to the length of time the gap remains closed, but simply that some unique relation exists between these quantities.

In the analogous electrical system shown in Fig. 2 there are three amplifiers, **A**, **B** and **C**. An electromagnetic pickup in the cylinder converts pressure variations into voltages which are introduced into the instrument. **A** corresponds to the spring S_2 and determines the sensitivity since by varying the downward tension of S_2, a given rate of change of pressure will cause more or less deflection of the meter if everything else remains fixed; whereas a change in the gain of the amplifier **A** will have the same effect on the electronic system. **B** corresponds to the gap in that a definite minimum voltage is required to cause any output from **B**, just as a definite velocity must be attained by the pin before it will close the gap. The amplifier **C** corresponds to the upper spring assembly S_1 and S_2. In this instrument **C** determines what a given output from the threshold shall read on the vacuum tube voltmeter **D**, just as S_1 and S_2 influence for a given S_3 setting the length of time the gap shall remain closed for a particular rate of change of pressure in the cylinder. The effect of the diaphragm on the bouncing pin is taken care of in the electronic instrument if the frequency response of the amplifier **A** is made to match that of the bouncing pin since this determines how the rate of change of pressure is related to the meter reading for a given setting of the instrument controls. The integrating time constants have been made to duplicate the response of the electrical circuit of the bouncing pin. The same Weston meter that is normally used in the A.S.T.M. method is employed by this instrument. The only operating controls which must be provided are the gain controls on amplifiers **A** and **C**. These two adjustments allow the operator to standardize the instrument on the engine.

TABLE 2—STABILITY-SENSITIVITY TESTS USING PHILLIPS DETONATION METER AND STANDARD BOUNCING PIN

Octane No. of blend	Bouncing pin knockmeter readings: Run number 1	2	3	4	5	Avg.	Stability
64	60	58	54	57	57	57.2	1.44
	60	58	54	57	57	57.2	1.44
	60	58	55	57	57	57.4	1.28
65	50	50	51	51	51	50.6	0.48
	50	50	51	51	51	50.6	0.48
	50	50	50	51	51	50.4	0.48
66	44	44	45	44	45	44.4	0.48
	44	44	46	44	45	44.6	0.72
	45	45	46	44	45	45.0	0.40
							0.80 av.
Computed Oct. No.	65.3	65.2	65.2	64.9	65.0	65.1	
(Sensitivity: 6.3 divisions per octane number)							
Knockmeter Readings (Phillips Detonation Meter)							
64	61	61	61	61	61	61.0	0.00
	61	62	61	61	61	61.2	0.32
	61	61	60	61	62	61.0	0.40
65	56	56	57	57	56	56.4	0.48
	56	56	57	57	56	56.4	0.48
	56	56	57	56	56	56.2	0.32
66	51	52	52	52	52	51.8	0.32
	51	51	52	52	52	51.6	0.48
	51	51	52	52	52	51.6	0.48
							0.36 av.
Computed Oct. No.	65.0	65.1	64.8	65.0	65.1	65.0	
(Sensitivity: 4.7 divisions per octane number)							

3. Principles Governing Adjustments of Electronic Detonation Meter

In both of the test methods mentioned previously, a fuel is rated by operating the engine with this fuel at the compression ratio which will give a meter reading near mid-scale at the fuel-air ratio at which maximum knock intensity occurs. Then a pair of reference fuels whose ratings are defined or known are selected which will, at the same compression ratio, give meter readings which bracket the unknown fuel reading. The fuel-air ratios of the reference blends are also adjusted for maximum knock intensity. The rating is determined from the three readings by linear interpolation. The difference between the reference fuel knock meter readings is called the spread and is one of the quantities which must be variable in order to meet the requirements of the test methods.

The means by which the spread variation is accomplished in this instrument may be shown by again referring to Fig. 2. The pickup in the engine puts out a voltage which is proportional to the rate of change of pressure in the cylinder, this voltage is amplified by the amplifier **A** to a higher level. The threshold amplifier **B** has the property that it simply subtracts a certain voltage from the output of **A** and passes it on to **C** for further amplification.

Let a = amplification constant of **A** (Fig. 2)
b = the voltage subtracted by the threshold amplifier **B**
c = amplification constant of **C**

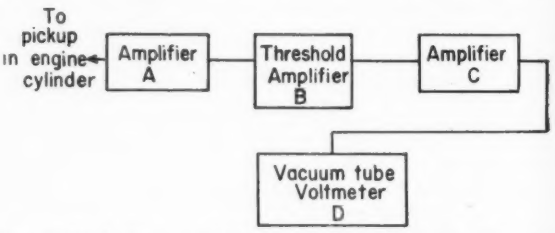
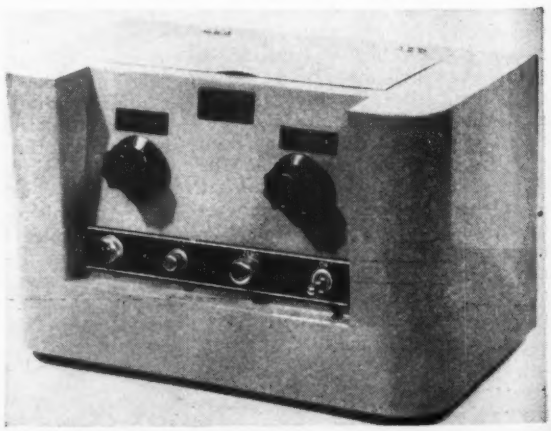


Fig. 2—Block diagram of Phillips electronic detonation meter for motor-fuel rating

Fig. 4—Phillips' electronic detonation meter



h_1, h_2 = the voltage output from the pickup for two different knock intensities, h_1 being the larger

D_1, D_2 = meter deflections caused by h_1, h_2

k = constant of the vacuum tube voltmeter

$D_1 = (ah_1 - b)\,c\,k$

$D_2 = (ah_2 - b)\,c\,k$

The ratio of the meter deflections is

$$\frac{D_1}{D_2} = \frac{(ah_1 - b)\,c\,k}{(ah_2 - b)\,c\,k} = \frac{ah_1 - b}{ah_2 - b}$$

As the denominator becomes smaller, the ratio becomes larger. At a glance one can see that when a and b are chosen so that $(ah_2 - b)$ becomes zero the ratio becomes infinite. What this means is that ah_2 is just below the threshold of B and therefore does not come through, so that D_2 is zero. Since h_1 is larger than h_2, ah_1 will pass through B and may be made to read any value on the meter by a choice of a suitable value for c. Thus the difference between D_1 and D_2 could be made to cover the entire scale if desired. In practice the spread is made as large as possible as long as the meter is stable and the spread limits prescribed by the methods are not exceeded. In the electronic instrument the adjustments are the controls which vary a and c so that the above conditions can be met. Their manipulation is so simple that the average operator can learn to make all necessary adjustments in one day. In the accompanying photograph of the instrument the knob marked "Sensitivity" varies the gain of **A** and the knob marked "spread" varies the gain of **C.**

4. Laboratory Test Results

In Tables 1, 2 and 3 the performance of the instrument is compared with that of the bouncing pin. Table 1 is a tabulation of octane ratings of a group of motor fuels selected to cover the entire range of the A.S.T.M. test method. Both bouncing pin and electronic detonation meter ratings are shown.

Table 2 is a stability test based on that described in the 1946 C.R.C. Handbook, pages 75 and 76. A group of three fuels differing in rating by one octane number steps are placed in the three carburetors. The engine is operated on the lowest octane number fuel first. At the end of 2 minutes a meter reading is taken, 10 seconds later another reading is recorded, and then a third. These three readings are tabulated. The next higher fuel is switched in and the same sequence repeated. Finally the same thing is done using the third fuel. The whole process is repeated five times, giving 45 readings. From these the middle fuel is rated five times, using the averages of each group of three readings and considering the other fuels as reference fuels. By this method an index of the stability is obtained. In Table 3, ratings of a group of fuels which were rated a number of times on different engines are tabulated to compare the reproducibility of the two devices. In Fig. 3 is plotted the standard A.S.T.M. guide curve. The guide curve obtained with the Phillips detonation meter is also plotted in this figure, with the instrument set to cross the standard curve at 65 octane number. It can be seen that the possibility of using this instrument over the entire range of the A.S.T.M. method with one standardization is definitely suggested. It is at present customary to standardize the bouncing pin near the octane level of the fuels to be rated. This multiple standardization is necessary because every bouncing pin will not follow the standard guide curve from 40 to 100 octane number without adjustment.

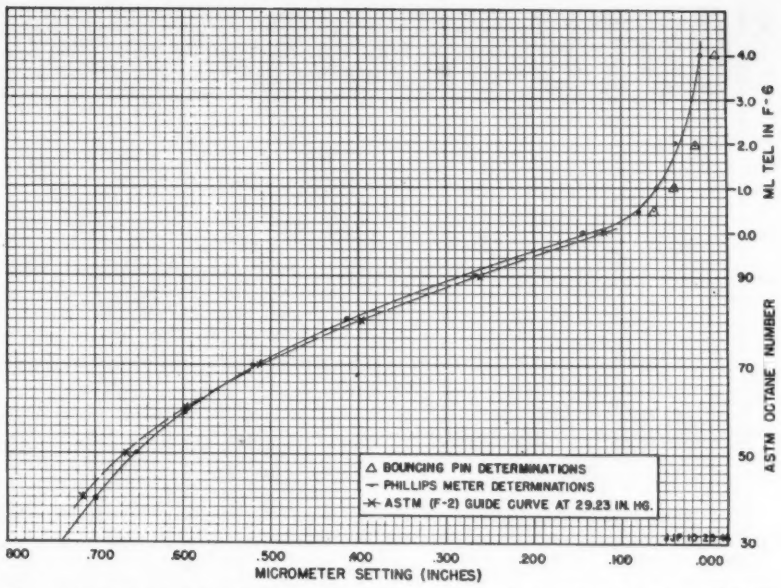


Fig. 3—Guide-curve determinations with Phillips meter and bouncing pin set on A.S.T.M. guide curve at 65 octane number

TABLE 3—A.S.T.M. (MOTOR) KNOCK TESTS RESULTS OBTAINED ON SEVERAL ENGINES USING THE STANDARD BOUNCING PIN AND PHILLIPS DETONATION METER

Fuel number and composition—	A.S.T.M. (Motor) octane number							
	Standard bouncing pin				Phillips detonation meter			
	Engine No. 1	Engine No. 2	Engine No. 3	Avg.	Engine No. 1	Engine No. 2	Engine No. 3	Avg.
1. 68.4% C.P. benzene + 31.6% C-13	86.3	86.3	86.3	...	84.7	85.3	84.6	...
	86.3	86.8	86.7	...	...	85.3	84.6	...
	...	...	...	...	...	85.3	...	...
	...	...	...	86.4	...	...	...	85.0
2. Cyclohexane	77.8	77.1	77.9	...	76.2	76.2	76.0	...
	77.5	77.3	78.0	...	...	76.1	76.2	...
	...	...	...	...	...	76.5	75.7	...
	...	...	...	77.6	...	...	...	76.1
3. Motor fuel blend containing 3.0 ml. TEL/gal.	77.6	77.8	78.6	...	78.2	77.8	77.8	...
	78.1	77.8	78.6	...	...	78.1	...	...
	...	...	...	...	...	78.3	...	...
	...	...	...	78.1	...	...	...	78.0
4. 70% X-4 in M-4	...	74.3	74.2	...	74.2	74.4	74.1	...
	...	...	74.4	...	...	73.8	73.9	...
	...	...	74.2	...	...	...	...	...
	...	...	...	74.3	...	...	...	74.1
3. Competitive motor fuel blend No. 2	...	74.2	74.1	...	73.8	74.2	...	...
	...	...	...	74.2	...	...	...	74.0

References

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SOUTH TEXAS *Giant*

U. S. Second Largest Oil Field Second Largest Gas Field Largest Condensate Reservoir

by Charles J. Deegan
and
Neil Williams

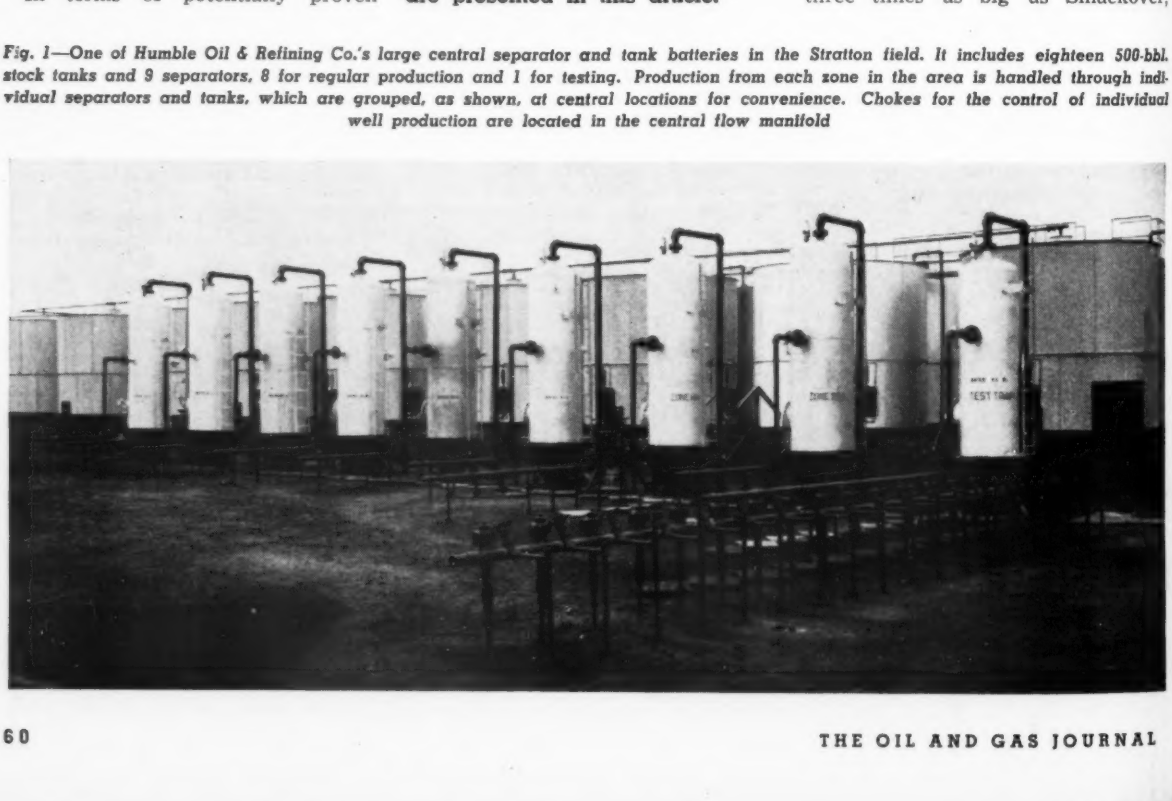
RECENT developments indicate that in South Texas, the second biggest oil field in the history of the United States has been found. The South Texas giant, like the No. 1 field, East Texas, in its early days, has previously been thought of as several separate fields. Now it seems likely that they will connect into one huge field 50 to 55 miles long by 3 to 7 miles wide, extending from the north end of Agua Dulce in Nueces County to the south end of La Gloria in Brooks County. There may or may not be some local dry spots in this stretch. (See Fig. 4.)

In terms of potentially proven reserves, it will probably rank second only to East Texas in oil; second only to Amarillo-Hugoton (considered geologically as one field) in gas; and first in condensate. Reasonable estimates of the potentially proven reserves are in the order of 1¼ to 1¾ billion barrels of oil; 12 to 15 trillion cubic feet of gas; and 300 to 400 million barrels of condensate.

In ultimate production of oil alone, it is quite likely to be twice as big as Long Beach or Midway-Sunset in California, or Oklahoma City, or Conroe or Yates in Texas; probably three times as big as Smackover,

WITH potentially proved reserves of from 1¼ to 1¾ billion barrels of oil, 300 to 400 million barrels of condensate, and from 10 to 15 trillion cubic feet of gas, a line of fields along the Vicksburg Flexure in South Texas appears to be merging into a single large producing area from 45 to 50 miles long and from 3 to 7 miles wide. High spots in the development and linking of these fields, and some of the major engineering and geological problems involved in their operation are presented in this article.

Fig. 1—One of Humble Oil & Refining Co.'s large central separator and tank batteries in the Stratton field. It includes eighteen 500-bbl. stock tanks and 9 separators, 8 for regular production and 1 for testing. Production from each zone in the area is handled through individual separators and tanks, which are grouped, as shown, at central locations for convenience. Chokes for the control of individual well production are located in the central flow manifold



Arkansas; probably four times as big as Salt Creek, Wyoming; probably five times as big as Salem, Illinois, or El Dorado, Kansas.

It has been growing slowly as a series of separate fields, which have gradually connected up in groups. The first discovery was shallow gas and oil at Agua Dulce as far back as 1928. Then came the Stratton field, discovered in 1931, followed by Seeligson in 1937, La Gloria in 1939, Tijerina and Canales in 1944, and Monte Negra and Borregas in 1945. The merging is not quite complete, but the general geological conditions are such that even if a few dry gaps intervene, it will be difficult to consider them as other than local spots in one huge field.

So slow has been the growth that it was the end of 1939 before the cumulative production of the whole area passed the million-barrel mark, and 1941 was the first yearly production to pass the million mark. As of July 1, 1946, the total accumulated production was only 55 million barrels, leaving over 95 per cent of the reserves to be recovered. The October allowable of 85,000 bbl. per day is at the 30-million-barrel-per-year rate.

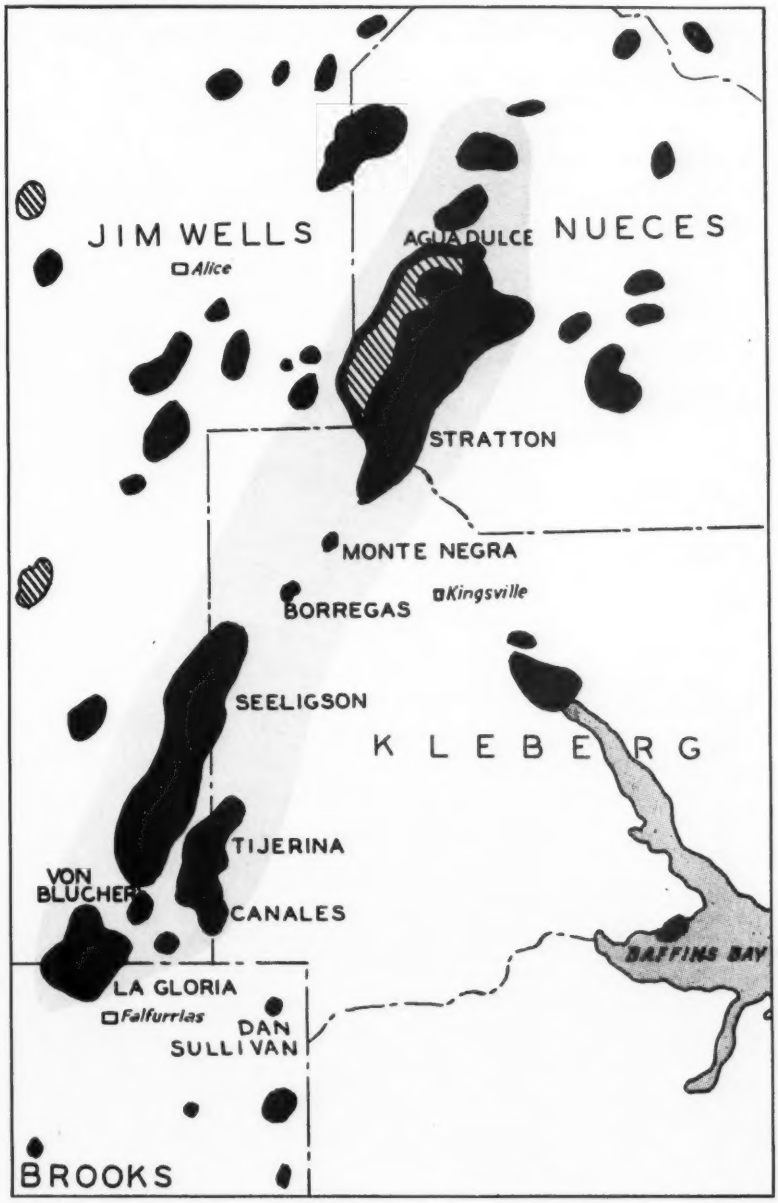
As at present, two of the richest spots in the area are the famous King Ranch and the Seeligson area. Humble Oil & Refining Co. has almost a blanket lease on the entire King Ranch, which thus far includes part of Stratton, all of Monte Negra and Borregas, and part of Seeligson. Another large portion of the Seeligson area is on the Seeligson ranch and development here was due to Arthur A. Seeligson and the late Tom Slick. Through deals with Magnolia Petroleum Co. and Sinclair Prairie Oil Co., the field was finally brought in in 1937, on the ranch. Magnolia owns 50 per cent, Sinclair Prairie 25 per cent, and Sunray Oil Corp., successor to the Seeligson-Slick interests, 25 per cent of the Seeligson Ranch lease.

The Seeligson field spread east and north into the King Ranch. Meantime, the Stratton field had merged on the north with Agua Dulce and spread south into the King Ranch. In the 11-mile gap between the north end of Seeligson and the south end of Stratton, on the King Ranch, Humble has now found two productive local structures, Monte Negra to the north, and Borregas to the south. (See Fig. 2). On the south end of Seeligson, the separate fields of Tijerina, Canales, and Von Blucher have practically merged with Seeligson. The LaGloria field appears to be a separate structure but only a short gap divides it and the Von Blucher field to the northeast. Several dry holes have been drilled in the gap but in view of the lenticular nature of the sands through the area, there eventually might be some connection between them.

The area is not a simple, one-pay reservoir like East Texas but produces from a multiplicity of lenticular sands extending through a Frio-Vicksburg section more than 2,500 ft. thick in places. On the Seeligson structure, where the greatest complexity exists, the sands range in depth from around 4,600 to below 7,000 ft. Some of the sands appear to carry only gas, or gas condensate. Others contain both oil and gas or gas condensate. At various places over the length of the area, over 85 separate and distinct reservoirs have been identified and labeled. They are not all present under every location, nor even most of them under any one well. They come in and shale out, some apparently rather small in area, others extending long distances over comparatively wide areas.

Geologically it appears that an enormously rich petroliferous source exists in a series of anticlinal folds along the regional feature known as the Vicksburg Flexure. Within the sedimentary section, wherever

Fig. 2—Area map showing relative locations and approximate present producing limits of the Agua Dulce, Stratton, Monte Negra, Borregas, Seeligson, Tijerina-Canales, Von Blucher, and La Gloria fields. North end of the Agua Dulce field is approximately 40 miles west of Corpus Christi (off map). Current development is directed toward linking the individual areas into one large field through a multiplicity of producing sands

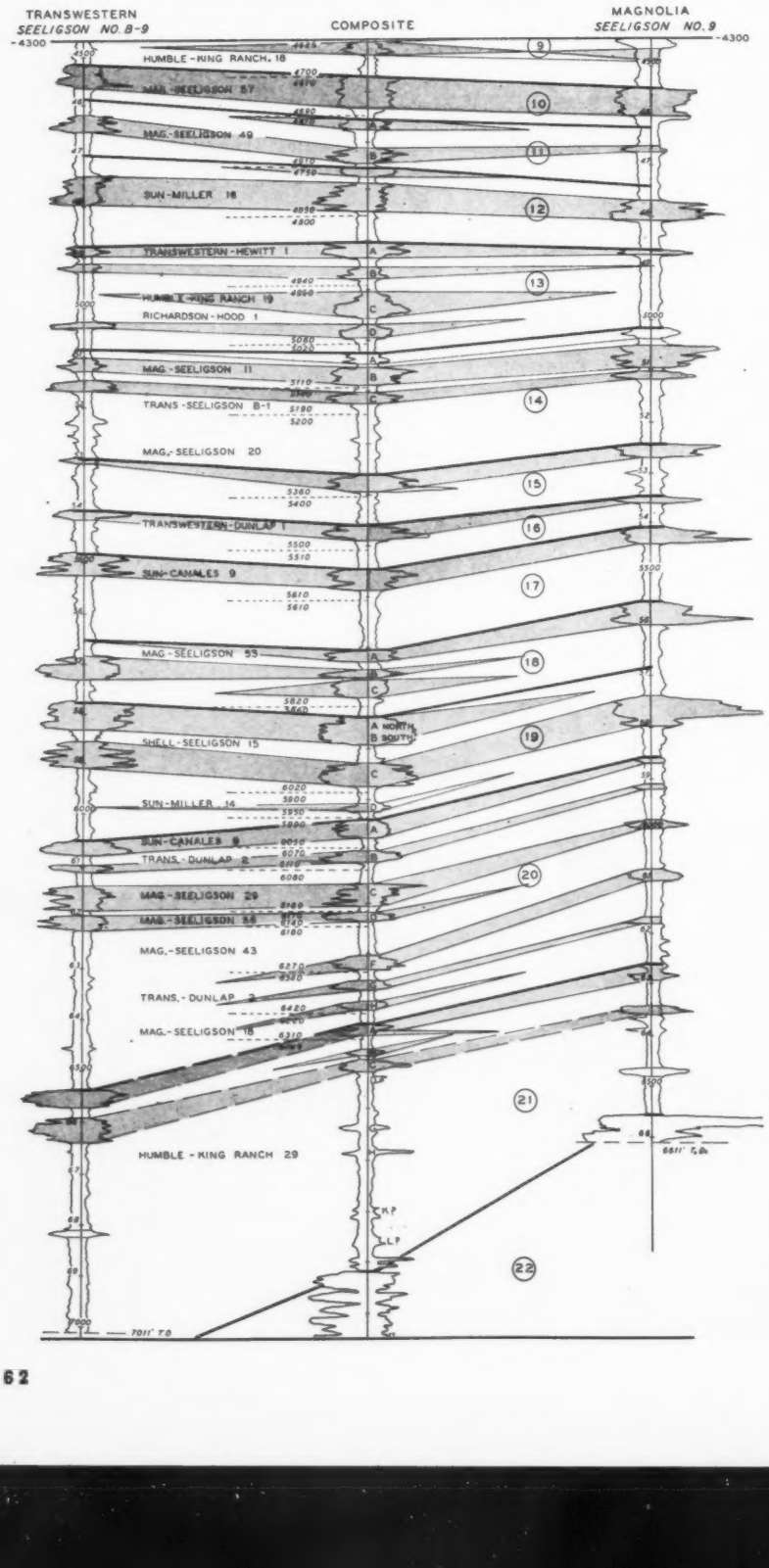


reservoir sands have developed sufficient porosity, and the local structural position is favorable, either oil, gas, or condensate, or some combination of these has accumulated.

Beyond that over-simplified statement, the geology, like everything else about this giant, becomes extremely complicated. Some of the results of this complexity are as follows:

1. Due to the lenticular sands, every well is at least a semiwildcat for any specific pay, and on an average, more drill-stem tests are made, and more coring is done per well, on development wells, than anywhere else in the United States.

Fig. 3—Type electrical logs showing multiplicity of producing zones and sand correlations in the Seeligson field. Approximately 45 separate reservoirs have been identified in the field. Three different types of traps, including anticlinal folds, faults, and wedges, are present in the fields. Sands are highly lenticular



2. Geological problems involved in properly developing the field are far greater than in any other big field ever found in the United States. Because of the size of the potential reserves, these problems are being given the most careful attention.

3. The large number of separate reservoirs, with their varying size and conditions, make this incomparably the biggest and most complicated petroleum engineering job ever faced.

4. The enormous gas and condensate reserves mean this is probably the biggest recycling problem ever attacked.

5. There are both engineering and geological committees operating in the area, working in the closest cooperation, so that their work meshes closely. The operating companies are all conscious of the size of the stake and the necessity of close cooperation and exchange of reservoir information in order to secure the greatest ultimate recovery.

6. Ten years ago it would have been impossible to develop and operate this field without tremendous waste. The progress in petroleum engineering and the development of practical reservoir engineering principles have barely been sufficient to cope with the complexity and size of the problems involved here.

7. Although present development plans are generally aimed at 40-acre spacing per oil-reservoir sand, and 160-acre spacing per condensate or gas reservoir, and dual completions are common, it is difficult to estimate what the final surface density of the well spacing will be. In parts of the field it is estimated the average well will find about four separate gas zones and three to four oil zones. This accounts for the high average number of drill-stem tests, amount of coring, and the running of an electric log on every well.

Development Trends

Current development is largely exploratory in its nature and designed to determine with a minimum number of wells the extent of the sands and productive outlines of the oil zones. Approximately 30 drilling rigs now are operating in this area. Spread from the north end of Agua Dulce to the south side of La Gloria, a distance of around 50 miles, they do not represent any large concentration of activity at any one place. But, in the aggregate, at key locations, they reflect an intensive effort on the part of the operators to link the sundry individual productive areas into one large field.

Probably of greatest immediate interest in development is the work being done by Humble Oil & Refining Co. on its King Ranch in outlining the Borregas and Monte Negra

structures and closing the gaps in production between the Stratton and Seeligson fields. The Borregas discovery, a gas well completed during 1945, is located less than 4 miles north of the present limits of Seeligson. It is considered reasonably certain that these areas will be joined. Three outpost tests are being drilled in the Borregas area, one 2½ miles to the northeast of the discovery well, another approximately a mile to the northwest, and the third about a mile to the southeast. The Monte Negra discovery, an oil well also completed in 1945, is about 6 miles to the northeast of the Borregas well. There is some doubt that these areas will be directly connected although it is likely that any dry area that might exist between them will be small. Between the Monte Negra well and Stratton is a gap of only a mile which is gradually being narrowed by continued southward extensions of the latter field's productive limits. Prior to drilling of the Monte Negra discovery well, a first test located about a mile to the southeast, had been abandoned as dry. However, a third test, located 6,900 ft. to the northwest of the discovery, has found the sands which are now being tested.

Deep Sand Potentialities

Southeast of the Tijerina-Canales field, Sun Oil Co. lately has completed two high-pressure gas-condensate wells below 10,000 ft. The two wells are located about 4 miles apart, one being about 1 2/3 miles southeast of the Canales area, and the other about a mile northwest of the Dan Sullivan field in northeastern Brooks County. In addition to providing a possible connection through deep sands between the Tijerina-Canales field and the Dan Sullivan field, about 6½ miles southeast, these wells give some indications of the potentialities of possible deep development of the sides of the present producing areas. The Tijerina - Canales field which immediately adjoins the main Seeligson area on the southeast, is now productive from sands at 7,100 to 7,400 ft., slightly deeper than in the Seeligson field proper. Production at Dan Sullivan, at present limited to one well, is from an 8,500-ft. sand.

Of the approximate 30 rigs running in this series of fields, 5 are in and immediately around the Tijerina-Canales area where, in a span of less than 2 years upwards of 103 wells have been completed. Tijerina and Canales originally were two separate areas and were so classed until June, this year. Not only have their productive areas joined but their sands have been established as the same. Sands now producing in the main Seeligson field are not productive in the Tijerina-Canales field, which is down structure and slightly lower than Seeligson, but their respective productive areas apparently are overlapping.

The same situation exists in the Von Blucher field, located further west on the south end of Seeligson. Sands at Von Blucher are found at approximately the same depth as those at Tijerina-Canales. There remains a gap

CRUDE-OIL PRODUCTION

Agua Dulce, Stratton, Monte Negra, Seeligson, Tijerina-Canales, Von Blucher and LaGloria Fields
(Thousands of barrels)

Year	Annual production	Cumulative production
1946*	10,983	55,063
1945	10,223	44,080
1944	15,251	24,857
1943	5,093	9,605
1942	1,592	4,513
1941	1,255	2,921
1940	343	1,666
1939	589	1,323
1938	397	734

*First six months.

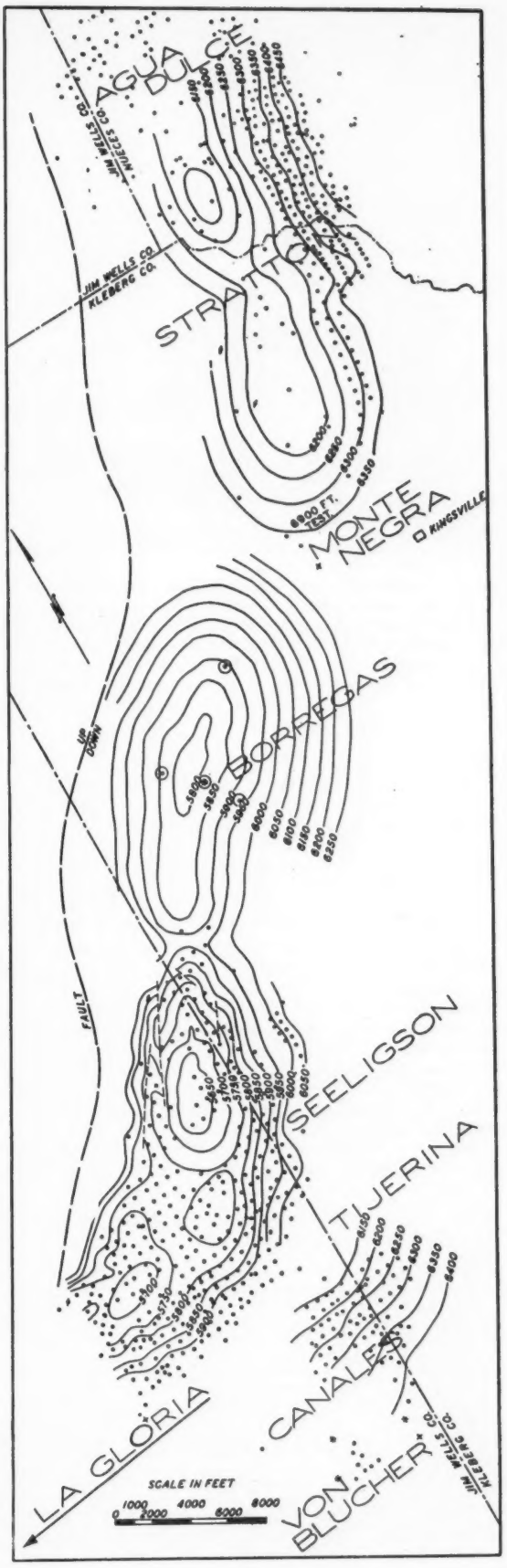


Fig. 4—Structure map of the Stratton, Borregas, Seeligson, and Tijerina-Canales fields of Nueces, Jim Wells and Kleberg counties, South Texas. It is considered fairly certain from the map that the Borregas structure connects with the north end of the Seeligson field, and that the Stratton and Monte Negra structures will join. Whether there will eventually be a direct tie-in of the latter areas with the Borregas and Seeligson structures is questionable. Indications point to the presence of a narrow dry gap, possibly a low saddle, although it is not improbable that some connection may be made

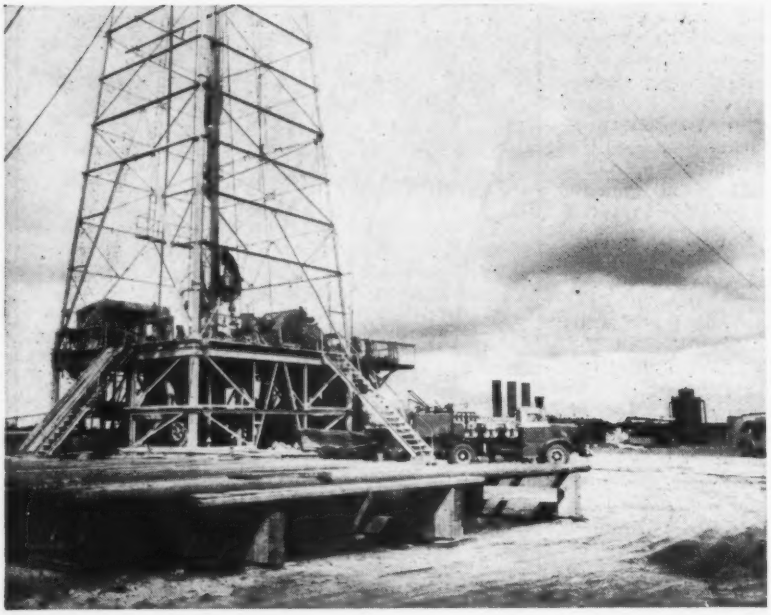


Fig. 5—Sun Oil Co.'s 4 E. G. Canales, 1 2/3 miles southeast of the Tijerina-Canales field, in Kleberg County, which is testing high-pressure gas-condensate sands below 10,000 ft. This well is approximately 4 miles north of a similar well completed recently by this company northwest of the Dan Sullivan field, northeastern Brooks County. These wells either open a new deep field for the district or establish a deep sand tie-in between the Tijerina-Canales and the Dan Sullivan fields, and indicate potentialities of deep sand development around the general Seeligson area

of only a little over 1½ miles between these two fields, and so far there is nothing to indicate these fields will not be joined. Only a gap of a few locations remains between the south end of Seeligson and the north end of Von Blucher.

Extensions at LaGloria

The LaGloria field is one of the district's major gas-condensate producing structures, on which large-scale cycling operations have been carried on for a number of years. Present exploration is directed to the downstructure phases of various condensate sands where important oil reserves are being uncovered around nearly all sides of the structure. Six rigs are now running in this area with drilling gradually being extended outward and downward from the original condensate area as additional deeper sands are being found. Drilling now has been extended as far south as the townsite of Falfurrias, in northern Brooks County, several miles from the original field.

Exclusive of gas and condensate production, there are approximately 1,132 wells in the combined fields of the area with additional wells being completed at the average rate of about one well every 30 to 35 days for each drilling rig. Of these, approximately 550 wells are in the main Seeligson field, taking in a present surface area of around 17,000 acres. The Tijerina-Canales and Von Blucher fields, on the south end of Seeligson, have 101 and 11 wells, respectively. Stratton, the second largest single area, has 240 oil wells, while Agua Dulce, at the north end of the line of fields, has 194 wells. In the light of present knowledge of sand and structure conditions, the latter field appears fairly well drilled up. Considerable additional potentially productive areas and sands remain to be exploited in and around the other fields.

AREA DEVELOPMENT BY FIELDS

Fields—	Year discovered	1946 completions (10 mos.) Oil	I.P. (bbl.)	Gas	Dry	Total	No. oil wells‡ (10-1-46)	Daily allowable prod. (Oct.)	No. drilling wells
Agua Dulce	1928	23	3,343	5	0	28	194	12,533	3
Stratton	1931	15	1,828	4	3	22	240	12,112	3
Monte Negra	1945	..	.....	..	..	..	1	120	1
Borregas	1945	..	.....	..	..	..	*1	.....	3
Seeligson	1937	63	13,329	0	2	65	553	47,833	5
Tijerina-Canales	1944	25	5,550	1	0	26	101	8,565	5
Von Blucher	1943	4	606	1	0	5	11	1,234	0
La Gloria	1939	19	2,719	10	1	30	29	2,674	6
Miscellaneous†	...	1	17	3	0	4	1	.....	3
Total		150	27,394	25	6	180	1,131	85,071	29

*Discovery well originally completed small oil well; recompleted as gas-condensate well; produced 934 bbl. condensate and 4,520,000 cu. ft. of gas during September; shut in prior to that time. †Unnamed semiwildcats. ‡Counts dual completions as two wells.

Gas Cycling Operations

Main oil development at Stratton and Agua Dulce flanks the east and north sides of an almost continuous gas-condensate producing area from 3 to 5 miles wide and from 12 to 15 miles long with its southern extremities undefined. Exploration in sands flanking the west side of this gas cap area has resulted only in spotted oil production.

The Agua Dulce and Stratton (including West Stratton) fields have a total of 140 gas wells with a daily gross production of 342,287,000 cu. ft. and a daily net production of 122,211,000 cu. ft. Accumulated gross gas production from wells in these fields has been 1,021,822,000 cu. ft. with an accumulated net production of 346,918,000 cu. ft. Accumulated recovery of natural-gas liquids has been 829,373 bbl. from wells and 19,128,521 bbl. from cycling and gasoline plants.

Gas sands at Stratton and Agua Dulce have been a major source of supply for several large transmission systems, including Tennessee Gas & Transmission Co.'s 24-in. line extending to the Appalachian district. Cycling operations for the recovery of the condensate reserves embrace a wide area in these sands. It was in this area that cycling as a means of recovering condensate and distillate had its inception. At present, five cycling projects are in operation, including Chicago Corp.'s Wardner plant in the Stratton area, and the same company's Coastal Gulf Plains plants and Agua Dulce Co.'s and Lockhart Oil Co.'s plants in the Agua Dulce sector. These plants process a total of from 700,000,000 to 800,000,000 cu. ft. of gas with a recovery of upwards of 6,500 bbl. of natural gas liquids daily. In addition, there are two natural-gasoline plants, one operated by United Gas Pipe Line Co. in the Agua Dulce field with an output of about 45,000 gal., and the other by Southern Minerals Corp. in the Stratton area with a recovery of about 12,000 gal. daily.

As the extent and outlines of gas producing areas and sands between Stratton and Seeligson become more thoroughly determined, it is contemplated that additional cycling projects and natural gasoline plant operations will be undertaken.

References

The Oil and Gas Journal, June 12, 1941, page 24.

The Oil and Gas Journal, August 11, 1945, page 74.

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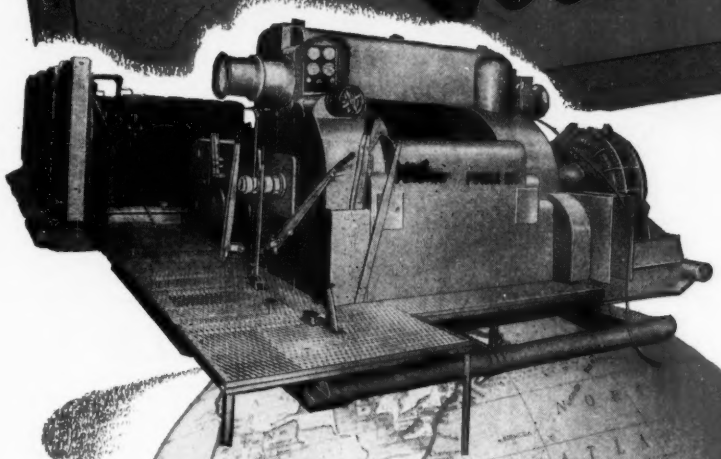

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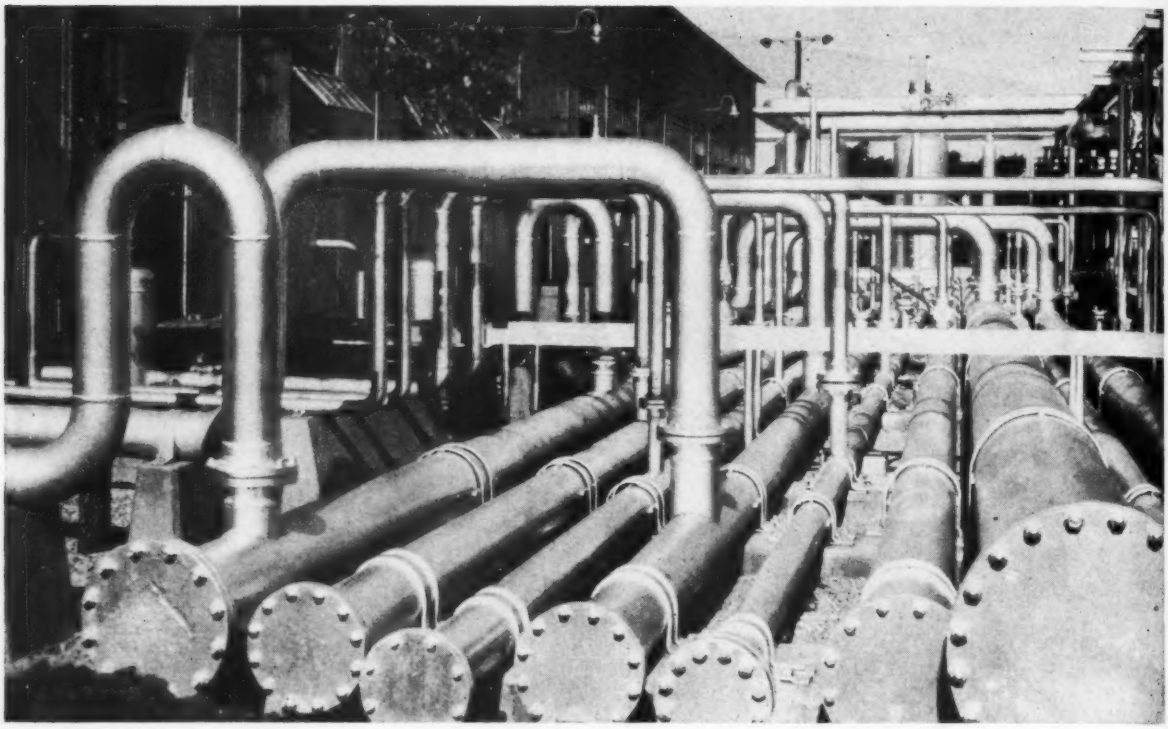


Gas at 500 psi. from certain of these headers passes to the injection wells. Other of the headers, all a part of Skelly Oil Co.'s expanded gasoline plant, also transfer the three stages of compression, handle water and fuel

11,667 PRODUCTIVE ACRES REPRESSURED

IN WEST PAMPA COOPERATIVE PROJECT

by Kenneth B. Barnes

THE West Pampa gas-repressuring program is particularly significant as a project where secondary-recovery work is starting out accompanied by thorough engineering and the necessary new equipment. Three noteworthy features are: (1) The project is "big," covering in its area 11,667 productive acres and including 26 active operating companies; (2) the producing formation is a dolomite pay (Wichita-Albany) of lower Permian, and heretofore there have not been many gas-injection operations in dolomites and limestones; (3) the sound engineering planning and operational procedures which are being used, extending even into the matter of training field personnel, will be of interest and assistance to other operators for reference in undertaking similar projects.

First gas injection into the West Pampa Repressuring Association project commenced on March 25, 1946. On that day a total of 11 injection wells were put into operation. Since that time, a multitude of field work and engineering details have been steadily carried on until today a total of 75 gas-injection wells are in active service. The project is laid out and designed so that the gas injection will eventually increase the production rate and ultimate recovery of as many as possible of the 895 producing wells included in the area.

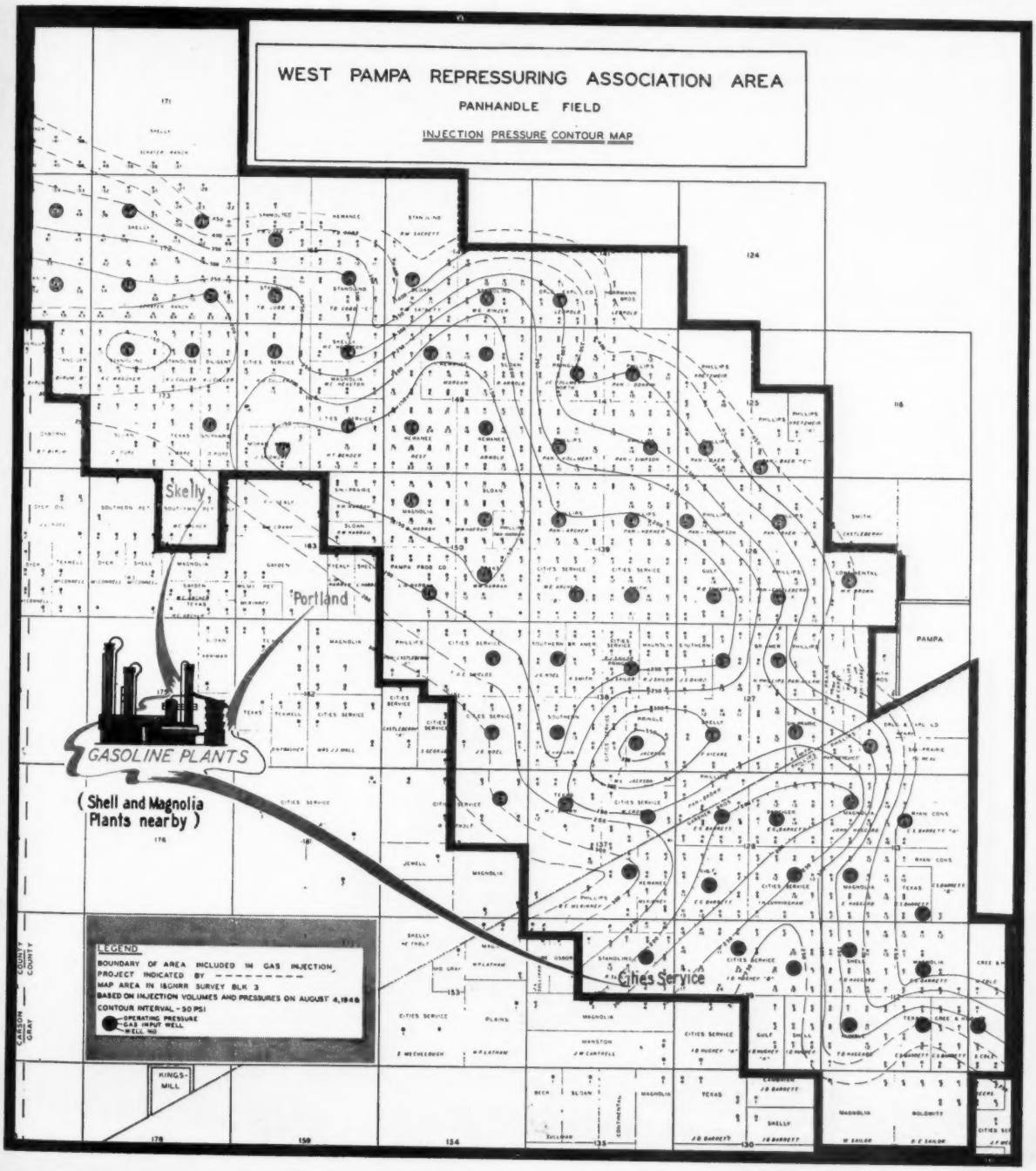
A separate article in this issue, page 72, describes the realignment and additions made to one of the gasoline plants at West Pampa to accommodate the repressuring program.

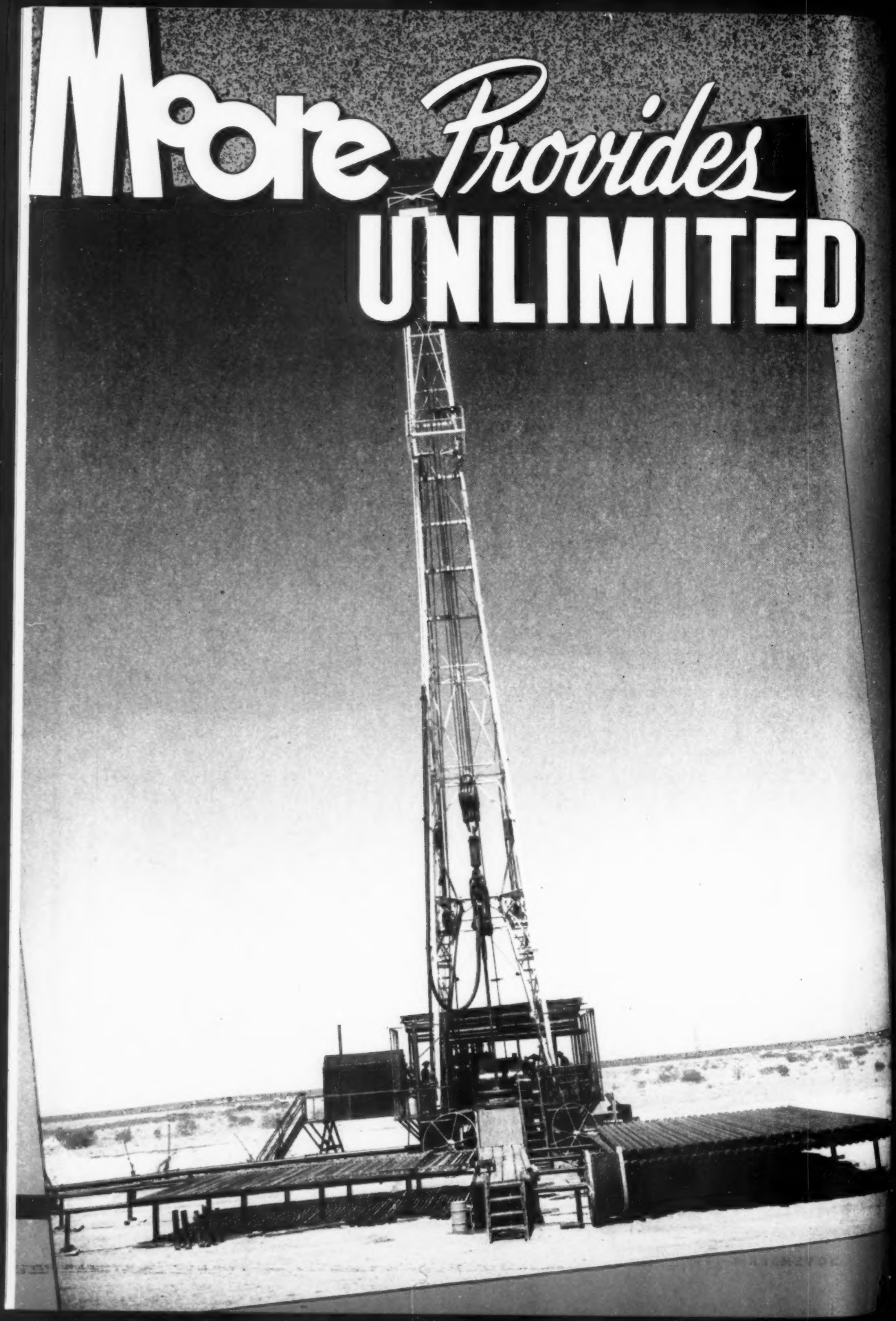
Start of the West Pampa Repressuring Association's project really goes to May 1943 when first engineering studies for the repressuring began. The findings developed were discussed at an operators' meeting held in October 1943. By July 1944, most of the many factors involved in the cooperative repressuring plan for the 101 different leases were in semifinal form. On September 18, 1944, to the various companies were sent the articles of agreement embracing the formation of the unincorporated, nonprofit association which is dedicated to cooperative effort of installing and maintaining gas-repressuring operations in the pool. The last signature to the agreement was made on January 13, 1945. (An article in The Oil and Gas Journal of February 10, 1945,

pages 74-79, presented geological data on the West Pampa area, details of the cooperative agreement and organization, and preliminary estimates about the project as to equipment needs, costs, recoveries, gas handling, etc.).

Immediately upon final approval of the West Pampa Repressuring Association, a smoothly working engineering organization for the project was set up by the operators. To work under the general committee of the association, a field engineering committee was formed. A full-time pool engineer, Fred J. Neslage, was employed by the association. The association set up offices for the pool engineer in the First National Bank Building at Pampa. At a meeting of the field engineering committee Neslage was chosen chairman. This committee meets monthly. Reports of these meetings, together with complete operational data of the entire project for each month, are issued to the participating companies by the pool engineer.

Concurrent with the actual repressuring undertaking, a comprehensive program of personnel training was started in Pampa and Borger. In these purely voluntary evening-study groups, the field men of the different companies learned just what was involved in the repressuring, what was good practice, and what was poor practice. Later, other study groups were organized at Lefors and Kellersville for similar conferences in the 2-year instructional program. Total enrollment has been more than 200, and also, more than 95 per cent of the supervisory personnel has engaged in the meetings. (An article covering the

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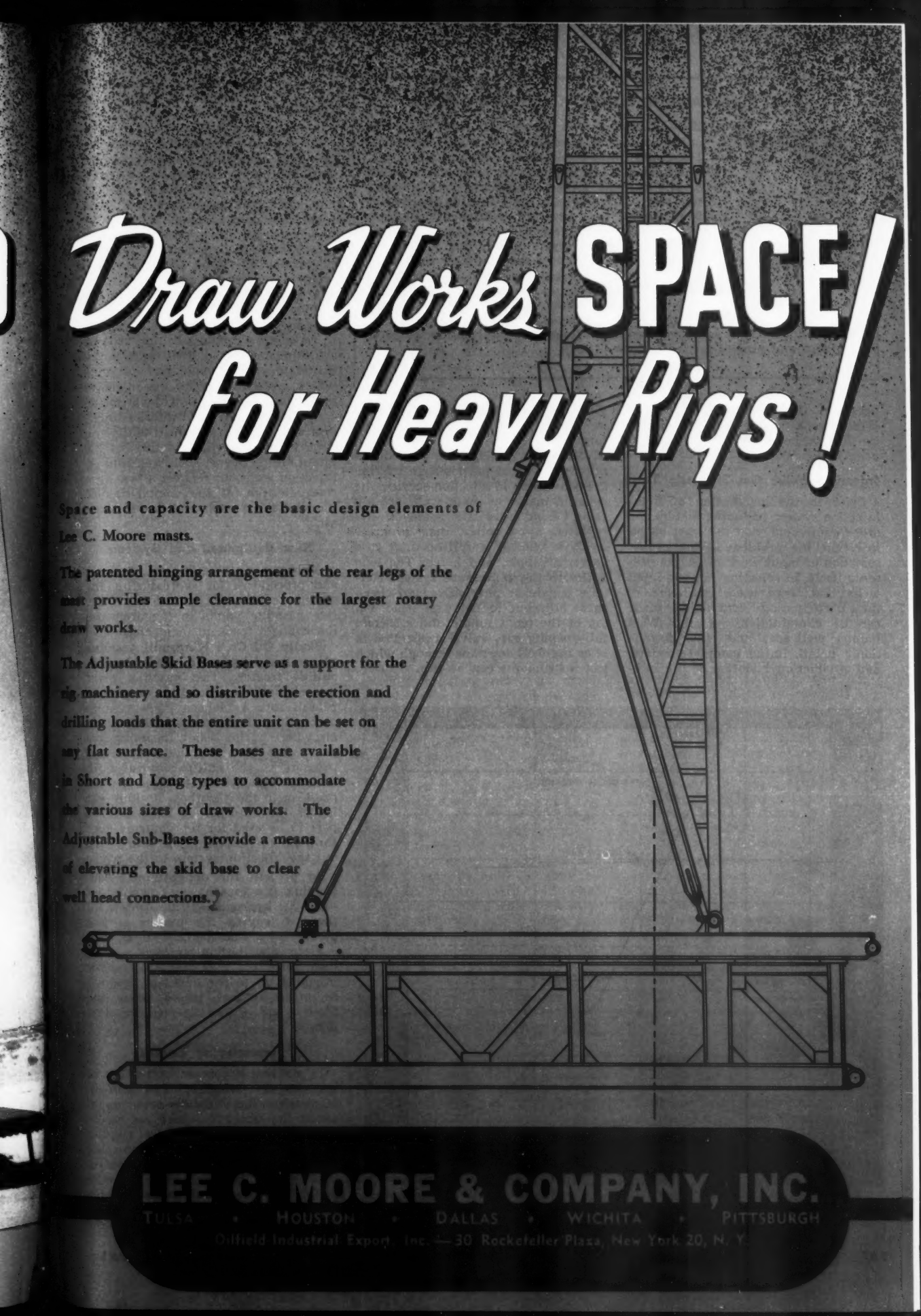
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FRED J. NESLAGE, WEST PAMPA POOL ENGINEER

NESLAGE was born in Kansas City, Mo. He graduated in petroleum engineering from University of Tulsa and was employed by Midco Oil Corp., 1933-1935, in its Tulsa offices and in development of the South Burbank field, Osage County, Oklahoma. He was with Carter Oil Co., 1935-1940, in the South Burbank Unit Block pressure-maintenance project and North Burbank repressuring program. Through 1940-1945 he was employed by Phillips Petroleum Co. as assistant district superintendent in North Burbank, later as assistant division superintendent of its western division at Amarillo. Two of the above years with Carter and with Phillips were spent as pool engineer in the North Burbank repressuring project. He has been employed by West Pampa Repressuring Association as pool engineer and project manager since 1945.

personnel-training courses for the West Pampa project was published in the Journal issue of February 23, 1946, page 147).

Injection Wells; Gas-Oil Ratio Tests

Prior to the installation of field-injection system including meters and other equipment, and the start of gas injection, the problem of the proper selection of input wells of course presents itself. In selecting the gas-input wells that were used, engineers of the participating companies made careful examinations of the West Pampa well logs and other formational detail, initial completion data, and production histories of the individual wells. All of the input wells now in use were "converted" from former oil wells, with the exception of two wells which were drilled expressly for input purposes. In making the conversion to injection service, the general plan for input-well hookup was: Casing head was removed and replaced by a collar, then progressively a swedge, a full-opening gate valve, a nipple, and a tee. The side outlet to the repressure system contains a gate or plug valve and check valve adjacent to the well head. On top of the tee a nipple and a second full-opening gate valve is installed to blow the well down, or through which test instruments can be run.

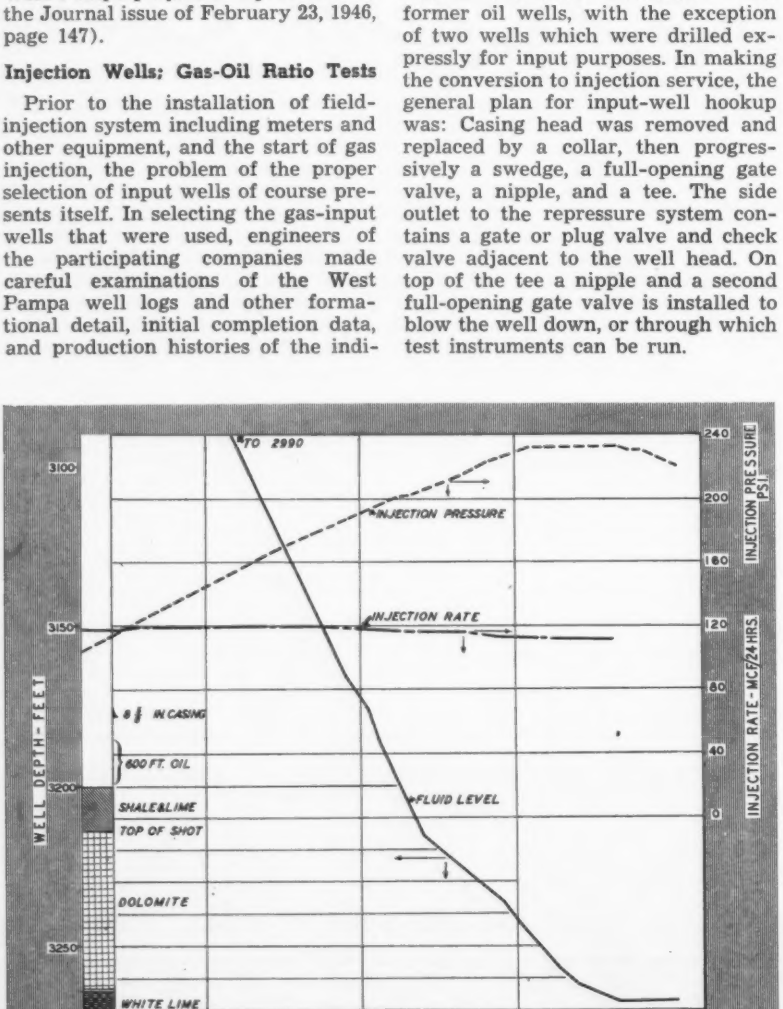


Fig. 1—Fluid-depression-rate curve from test of one of the gas injection wells. (See discussion on "Fluid level determinations in input wells")

Another important factor in repressuring is the matter of individual-well oil-and-gas-production tests and gas-oil ratios. At West Pampa these matters were given careful consideration. All companies added whatever equipment was necessary so that individual well tests were made prior to any gas injection, and so that later tests also could be made periodically to gage repressuring results and to form a basis for any change in operations that might be indicated. Still another reason for the well gaging was for compliance with special order No. 10-833 of the Texas Railroad Commission which permits the operators to repressure in West Pampa area of the Panhandle field. This order authorizes an oil allowable for the wells which are converted to gas-injection service and provides that "prior to the conversion of any well into an injection well the operator shall notify the deputy supervisor, in writing, of his intention to convert such well into an injection well and request a test by a representative of the commission of the ability of such well to produce oil."

New Equipment and Systems

As to new field equipment, systems, and procedures for repressuring, including continued operation of the five gasoline plants in the area and the changes made in them, these are:

Skelly Oil Co.'s Kingsmill gasoline plant; the dehydrator and hydrogen-sulfide treater.—This gasoline plant was virtually completely revamped or rebuilt into a modern high-pressure absorption plant (see specific article elsewhere in this issue). Incoming wet gas passes from the first-stage compressors to the sulfur-removal unit, then through two more stages of compression to the absorber. Residue gas leaves the absorber at 500 psi. That part to be used for repressuring goes through the dehydration unit, then out the injection system to the wells.

At present the dehydrator is delivering gas that has a dewpoint of —10° F.; hydrogen-sulfide content of the gas leaving the treater is less than ¼ of a grain per 100 cu. ft.

Field distribution systems. — New lines carry the high-pressure gas for injection up to the edges of the different individual leases from the Skelly and Cities Service gasoline plants.

Repressuring Details

In starting a repressure project of the size and scope of West Pampa, many operational details come up at about the time of initial gas injection. As they occur, some require considerable attention, some are troublesome; however, ordinarily their proper handling soon is satisfactorily arranged and matters thereafter are carried on in routine fashion. Some such factors which came

up during the earlier months of gas injection at West Pampa were:

Reconditioning of oil wells. — To secure proper benefits from repressuring work, producing oil wells must be in good order both as to subsurface conditions and as to producing equipment. Individual companies at West Pampa have carried on a sizable program in reworking their oil wells and are continuing. The operations include cleaning out, drilling deeper, shooting, reshooting. Acidizing also is performed on some wells as a part of the workover. In general, these jobs have been fairly successful, purely from the improvements made of the former completion conditions. However, it is generally expected that considerable further benefits of a longtime nature will derive from the workovers as gas injection continues and the repressuring becomes more advanced.

Freezeups at input wells.—At the start of the project considerable difficulty was experienced with freezeups at the control valve on the upstream side of the meter loops. For the first few days this was a very critical problem in that freezeups were so numerous that it was difficult to keep the majority of the injection wells operating. These freezeups, without doubt, were due to condensed moisture within the line itself, with the water in such minute quantities that the accumulations could not be removed when purging and blowing down the lines prior to use. This situation, however, soon improved as greater quantities of dry gas from the plant passed through the lines. The gas basically, of course, is fairly dry with the dewpoint at —10° F. At present no difficulty whatsoever is being experienced with regard to freezeups.

Fluid level determinations in input wells.—Fluid-level measurements of many of the gas-input wells were made by float-measuring-line means because of a peculiar sequence of producing sections in parts of the field. The "brown dolomite" is a massive granular dolomite starting above the first productive pay zone. First developed porosity occurs after 30 to 40 ft. penetration. Starting at this point are a number of granular dolomite sections and an important oolitic zone which carries most of the porosity and makes up a large portion of the oil reservoir. Underlying is a porous granite wash series (Cisco) of the upper Pennsylvanian which underneath some parts of the project is water bearing. In parts of the field a gas pay overlies the oil section in the brown dolomite formation. Important to the repressuring is that the fluid levels in the input wells be depressed sufficiently and conditions be such that gas enters all of the oil pay section.

Fig. 1 shows details of one of the fluid-level tests of an input well. Prior to the test the well was opened to the atmosphere and the fluid level allowed to become static. Gas was admitted at 100 to 120 M.c.f. per day and the position of the lowering fluid level followed with a float, carried on a steel measuring line run through a stuffing box. The fluid reached a final depth of 3,267 ft. after gas injection for 3 hours and 52 minutes. Maximum input pressure of 232 psi. was reached at this depth.

From the fluid-level depression curve it will be noted that the rate of depression of the fluid level was practically constant until the fluid was well below the casing point and down to the top of the producing brown dolomite pay section. This change in the slope of the curve occurred at 3,215 ft. At this point the rate of fluid depression substantially slowed down, from 2.1 to 0.8 ft. per minute. This slowing effect was felt due to the fact that the fluid had been lowered to a point that was porous and permeable enough to start accepting gas at the available pressure. However, the fluid column continued to depress with additional time and more permeable formation was exposed to gas entry. From this test it was concluded that gas would not enter the upper dolomite formation until the top of the oil pay zone was reached, and that the fluid level was depressed sufficiently at the minimum injection pressure to expose the entire brown dolomite oil pay section to the gas input stream.

Well-producing schedules.—To maintain a uniform flow of produced gas to the gasoline plants, a varied pumping schedule has been worked out on the different individual leases. These are arranged mostly in three 8-hour periods for each day. All wells at West Pampa are produced by pumping. It can be seen that if all wells on all of the leases, for example, were pumped off during only the middle part of the day (full-time wells are in the minority) the total gas volumes during this period and immediately thereafter would, under repressuring, present definite overloads to the gasoline plants, compressors, absorbers, etc. These loads, beyond the capacity of the facilities, would result in venting and wastage of valuable gas.

Producing schedules worked out by the pool engineer and the operators for the oil wells are such that some leases are pumped earlier in the morning, others later in the afternoon, some during the night. One company is using pumping schedules whereby the high-gas-oil-ratio wells on a lease are produced at night. Another company has installed smaller pumps in some wells and is producing them 16 hours per day. Three leases of another company are in a "group operation" schedule with certain wells producing during daylight and others at night. Some wells are controlled by electric time clocks and other automatic shutdown devices.

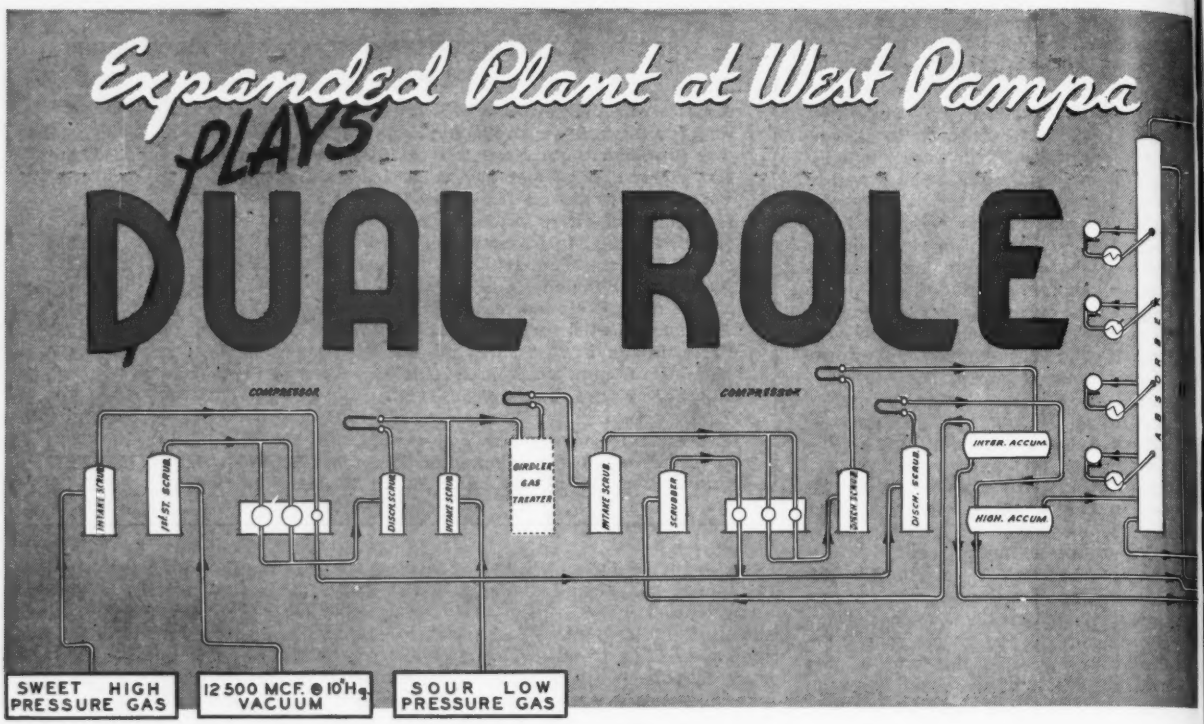
Injection rates.—At the commencement of the project, it was the policy to use relatively low rates of injection to each input well, between 50 to 75 M.c.f. per day. Maximum permissible rate later was raised from 75 to 125 M.c.f. per well per day, effective after 6 months of gas injection has been completed, or to October 1, 1946. Each input well carries a definite quota as to the average input volume which it is to receive each day. At the present time approximately 80 per cent of the available total field residue gas is being injected.

Vacuum and back pressure on pumping wells.—Before repressuring was commenced several inches of vacuum were pulled on some of the leases, but under repressuring usually not more than approximately 2 in. of mercury is being carried on any well, and in most cases there is from 1 to 5 lb. pressure.

WEST PAMPA REPRESSURING—DATA FOR SEPTEMBER 1946 OPERATIONS

Gross oil production, bbl. per day	11,308
Avg. production per producing well, bbl. per day.	12.63
Gas production, M.c.f. per day at 14.65 press. base	17,701
Gas injected, M.c.f. per day at 14.65 press. base	4,338
Per cent of produced gas injected	24.5
Produced gas-oil ratio, cu. ft./bbl.	1,565
Injected gas-oil ratio, cu. ft./bbl.	384
Net gas-oil ratio, cu. ft./bbl.	1,181
Maximum injection pressure, psi.	479
Minimum injection pressure, psi.	93
Average injection pressure, psi.	261
Producing days	30
Number of input wells in service	75
Number of producing wells	895
Total acreage in repressure area	11,667
Average oil recovery, bbl. per acre	6,062
Cumulative oil production as of September 30, 1946, bbl.	70,722,883
Cumulative gas injected since March 25, 1946, M.c.f.	763,489

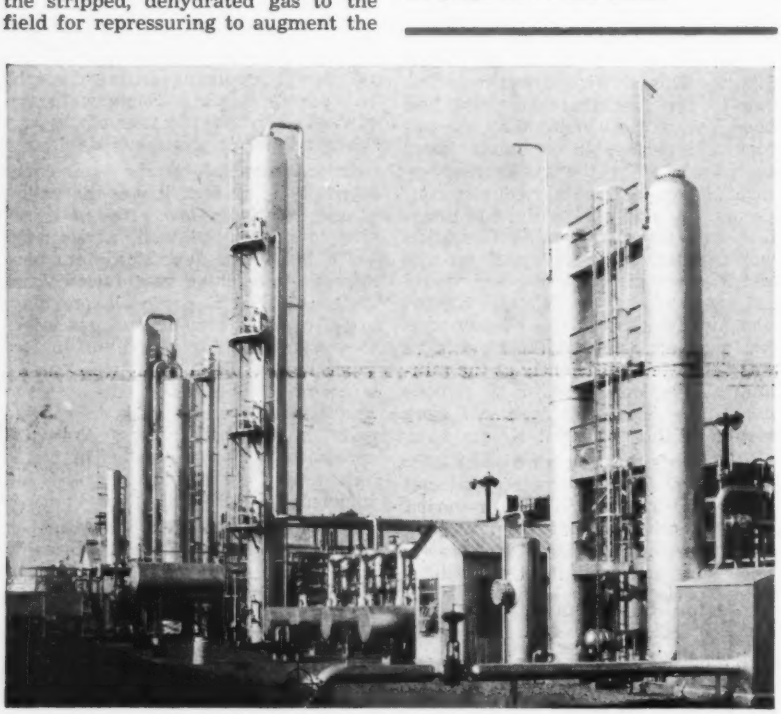
Expanded Plant at West Pampa PLAYS DUAL ROLE



by Arch L. Foster

The repressuring project at West Pampa, for which the new gasoline plant described herein was built, is discussed in an article beginning on page 66 of this issue.

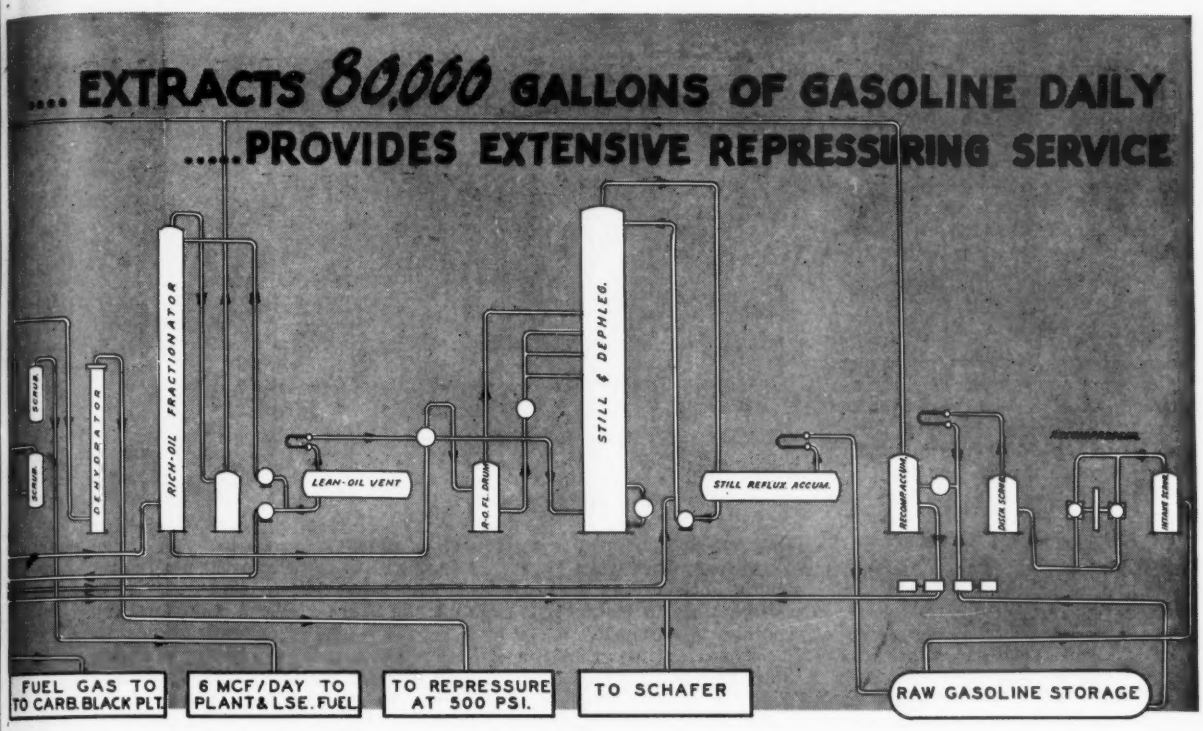
COLLECTING casinghead gases from the wells in the West Pampa field, Texas Panhandle, Skelly Oil Co.'s expanded Kingsmill natural gasoline plant recovers all practicable natural and liquefiable hydrocarbons from 13,000,000 cu. ft. of community gas and 12,000,000 cu. ft. of sweet high-pressure gas per day. After processing, the plant returns a portion of the stripped, dehydrated gas to the field for repressuring to augment the crude production from that field. Practically every operator in the field, large and small, is cooperating in the West Pampa Repressuring Association's project in that field. Walco Engineering & Construction Co. was the general contractor for the plant construction under the supervision of Skelly Oil Co.'s natural-gasoline department. This department is operating the entire plant and repressuring distribution system under agreement with the association.



Twin dehydrator towers for removing water vapor from stripped gas are shown at the right in this view

The plant is handling at present about 12,500,000 cu. ft. of casinghead gas, bringing it in from the wells at 0 to 5 in. of mercury vacuum on the suction side of the compressors. Besides this gas, about 500,000 cu. ft. of sour pressure gas also comes in to the plant.

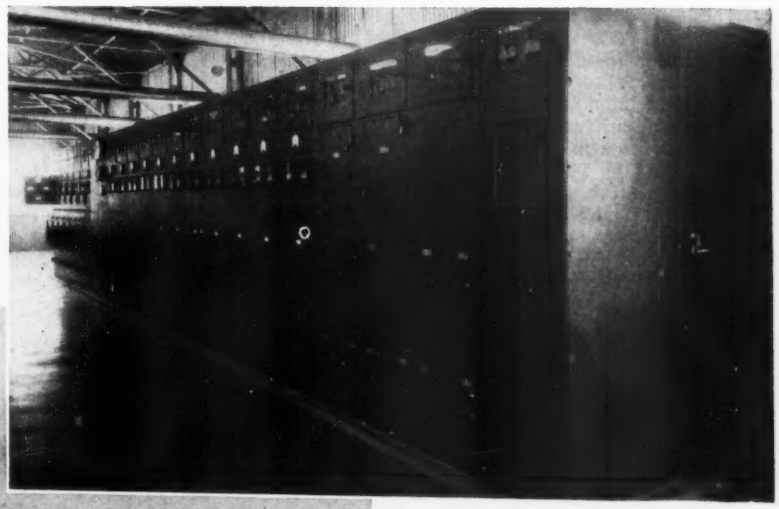
The gas enters the first stage of compression which is handled by eight 24 by 14-in. compressor cylinders directly connected to four 400-hp. Clark angle-compressor units and six 18 by 20-in. compressor cylinders directly connected to three 225-hp. Cooper-Bessemer Type X compressor units. (Fig. 1). From this stage the gas passes at about 37 psig. to the Girbotol sulfur-removal unit which, with the dehydration unit, was designed by J. F. Pritchard & Co.'s petroleum division. The hydrogen sulfide content of the combined gases entering the sulfur-removal unit is of the order of 200-220 grains per 100

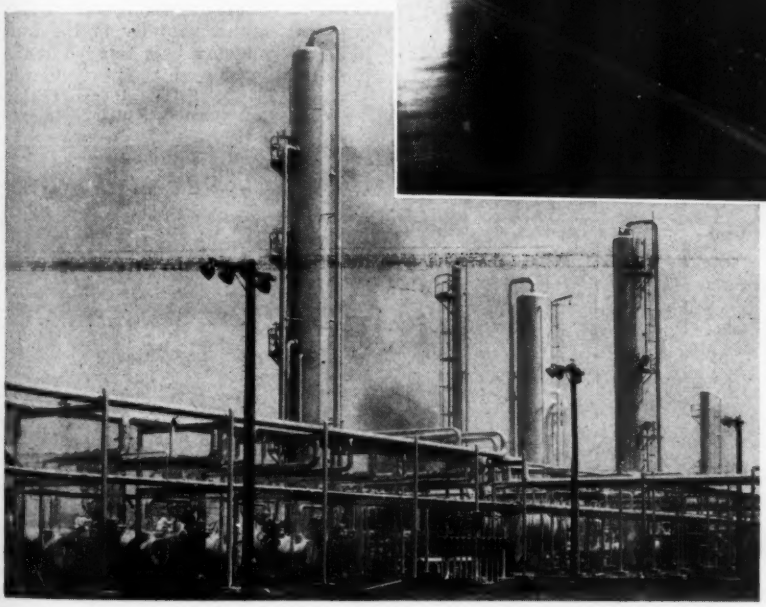


Flow chart of the Skelly Oil Co. gasoline plant at Kingsmill, Tex., processing gas for natural-gasoline recovery and dehydration prior to its return to the producing horizon

cu. ft., 2 per cent carbon dioxide, and approximately 1 per cent air, the relative amounts varying somewhat from time to time.

The reagent used in this process, which removes both carbon dioxide and hydrogen sulfide, is a water solution of diethanolamine, a chemical which is widely used for this purpose. Condensed steam is used for making up the solution. This solution is circulated through the tower at the rate





Left: Absorbers and fractionators at the Kingsmill plant. Above: View of the control board at the plant

of about 150 gal. per minute. The spent solution is regenerated by heating to 175°-210° F. to drive off the hydrogen sulfide. The concentration of diethanolamine in the solution is about 25 per cent. The concentration of hydrogen sulfide left in the treated gases is less than 1 grain per 100 cu. ft., the carbon dioxide content less than 0.1 per cent by volume.

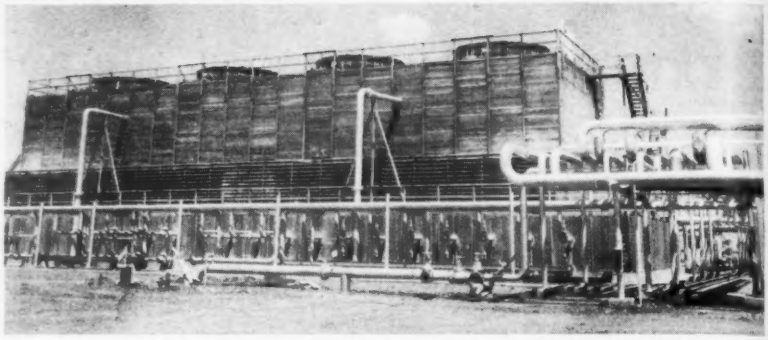
A solution purifier was started recently to remove the thiosulfates, an

impurity which forms in the treating solution. A portion of the spent and regenerated solution is bypassed continuously to be washed by a caustic soda solution which removes the thiosulfates in the form of sodium thiosulfate.

The treated gas is returned to the compressor system at about 30 psig. for compression through the second and third stages to an ultimate pressure of 500 psig. The second and third compression stages are accomplished by ten 11½ by 14-in. compressor cylinders respectively, all directly connected to five 500-hp. Clarke angle-compressor units. The gasoline dropped out of the gas at the end of each of these stages of compression is sent to storage. Here it is interesting to note that all compressor scrubbers are equipped with electric-horn alarms which operate when the liquid level reaches a point which may be dangerous as to carryover to the compressors. An automatic shutdown is also provided in case this liquid level continues to rise for any reason.

The well-pressure gas comes in at 85 psig., enters six 7¼ by 20-in. Cooper-Bessemer compressors, and four 7¼ by 14-in. Clark compressors and is compressed to 500 psig. in one stage. The two streams of gas, each at 500 psig., combine immediately beyond the discharge from the cylinders, and the total stream is cooled to about 85° F. The gas then passes to the third-stage accumulator where some 15 per cent of the total liquid gasoline production is "dropped out" of the stream and sent to storage.

The gas is now passed to the absorber at 500 psig. The absorption oil is about 36° A.P.I. gravity, and its boiling range is normally from 530°-600° F. The absorber contains 24 bubble trays; after the oil passes each set of five trays, the absorption oil is withdrawn from the column and is passed through the tubes of a cooler exchanger. In the shell of the exchanger propane is expended to obtain refrigeration which cools the oil to 60° F. The oil-gas ratio in the absorber is about 12 gal. per 1,000 cu. ft. The gas is stripped to a specific gravity of about 0.66 under normal operating conditions.



Forced-draft towers are very efficient water-cooling systems

After being stripped in the absorber, the dry gas goes direct to its several outlets. Some 3,000,000 cu. ft. per day goes to leases for field uses. Another approximately 3,000,000 cu. ft. is used at the plant for fuel. Of the remainder some 5,000,000 cu. ft. is used for repressuring in the West Pampa field. The residue is sold to Cabot Carbon Co. Incidentally, some three-fourths of the American production of carbon black is manufactured within the limits of the Texas Panhandle gas field.

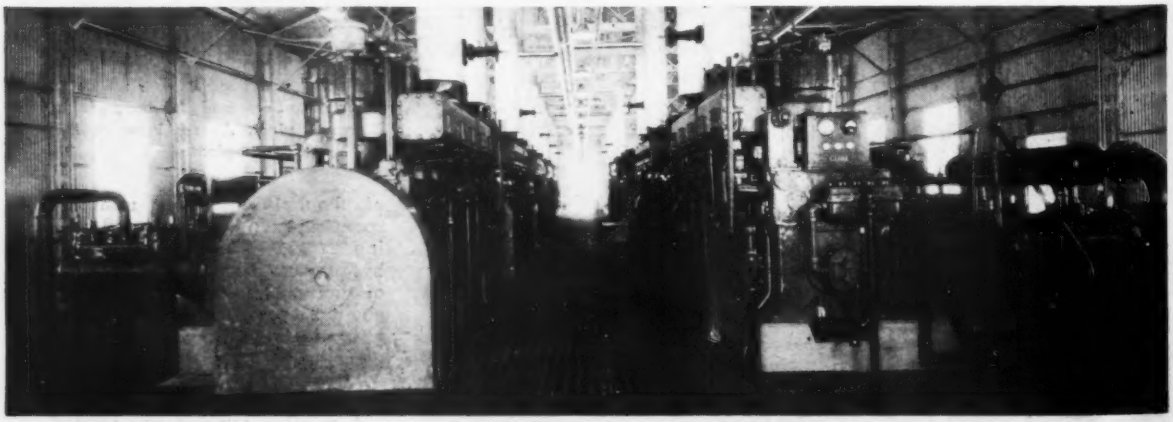
In the cooperative repressuring work, each lease in the field is provided with a meter which measures the raw gas from each group. Each company is paid for the gasoline content of the raw gas according to contracts. The stripped gas for the repressuring is pooled, and passes to the field lines for injection into the formation at about 490 psig. Gas at about 75 psig. is returned to the leases for lease fuel while the gas used in carbon-black manufacture is delivered at about 50 psig.

The fat oil from the bottom of the absorber is passed at about 90° F. to the rich-oil fractionator and flashed at this point to a pressure of approximately 100 psig. This tower is refluxed with cool lean absorption oil which contacts the flashed gases on 22 bubble trays, reabsorbing the desirable hydrocarbons. The flashed gas not absorbed in the operation is introduced into the residue system.

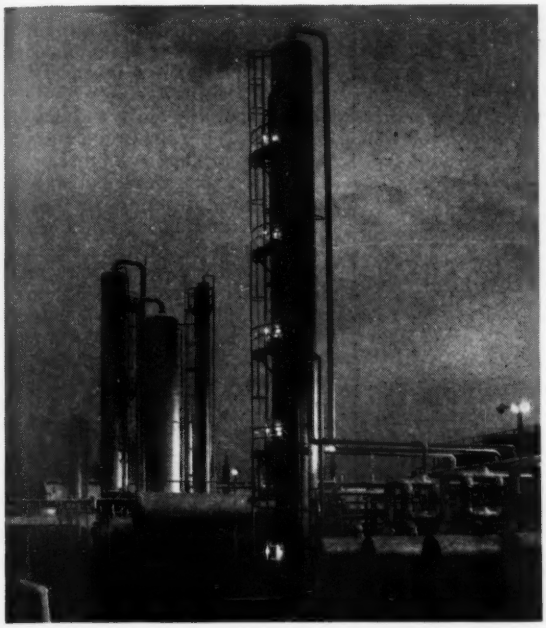
The fat oil from the bottom of the rich-oil fractionator goes through shell-and-tube heat exchangers into a flash drum. At this point vapors are flashed from the heated oil directly to the fractionator section of the still. The oil is passed through steam-heated preheaters for further heating before entering the still.

The still is a column 7 ft. in diameter and 52 ft. high, containing 20 bubble trays, and operates at about 50 psig. Lean oil from the bottom of the still is passed in heat exchange with the incoming fat oil, starting through the exchanger at about 340° F. and emerging at about 150° F. It is then cooled in atmospheric coils to about 85° F. and is returned to oil circulation storage.

From the top of the still the vapors, which include all the natural-gasoline hydrocarbons, go to atmospheric condensers. These are made up of fin-type coils set horizontally, and is draft induced by means of a fan set at the top of the cooler unit. The vapors in passing through this unit are cooled



Double battery of compressors at the Kingsmill plant



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This expanded plant, located in the Texas Panhandle, processes 12,500,000 cu. ft. of casinghead gas plus 500,000 cu. ft. of sour pressure gas daily. It recovers 80,000 gallons of liquid from these combined Pampa gases and supplies stripped and dehydrated gas for repressuring the West Pampa field.

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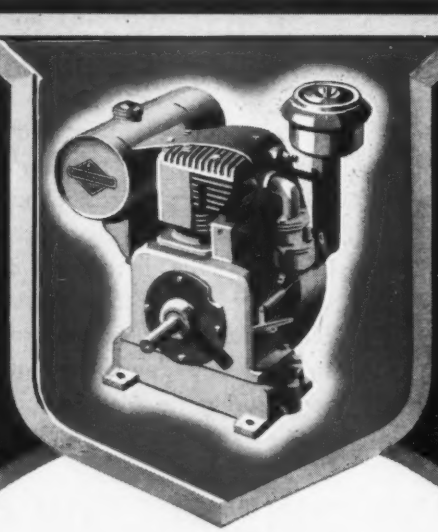

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to 120° F. and the unit is controlled automatically. Vapors and liquid then pass to water-cooled coils where the temperature is reduced to about 85° F. and the condensate is pumped to the "make" tanks. These tanks are cylindrical, 12 ft. in diameter by 42 ft. in length, and are built and tested for 150 psig. The raw product is stored at 40 psig. or slightly higher.

Vapors from these tanks are returned to the recompressors, of which four are used in this service. They are Cooper-Bessemers, 10¾ by 20 in., driven by Type 10 Bessemer engines. The recompressed vapors are cooled to 85° F. and then in the propane chillers are cooled further to 60° F. The liquid product goes to the accumulators to join the other liquid products. The raw liquid product is then transferred to another plant (Schafer) in the field for fractionation to make the finished products. In that plant are made 16 to 26-lb. natural gasoline, propane, and propane-butane mixtures for L.P.G., as well as isobutane and normal butane fractions.

Gas Dehydrator

In the operation of this plant only the gas to be used for the repressuring is dehydrated. Twin towers containing granulated Florite are on stream and on regeneration alternately. Each tower is on stream for 12 hours in drying the stripped gas and is on regeneration or idle 12 hours; thus a complete "turnaround" occurs each 24 hours.

In regenerating the drying agent, the flow of gas through the individual tower is reversed and a reduced volume of gas is heated in a special heater to 350° F. and is passed through the Florite to vaporize and remove the absorbed water.

Plant Power Requirements

Power is generated in the plant by six 225-hp. generators directly connected to 333-hp. Ingersoll-Rand PVG-8 gas engines. Boiler capacity includes six 65-hp. and three 125-hp. oil field five-tube type boilers. Young-Happy atmospheric cooler radiators are used on the jacket water to the electric-power-generating engines. The plant cooling tower is Pritchard-designed, with the induced draft via four electric-driven fans.

A 450-g.p.m. water well was drilled in the plant yard, 500 ft. deep. It is equipped with a Peerless motor-driven lift-type centrifugal pump. This water has about 15 grains of hardness which is treated with sulfuric acid for the cooling tower feed. For boiler feed the water is treated with Dearborn water-treating compounds. All engine-cooling jacket water is handled in closed-type systems initially filled with condensed steam, and require a very low rate of makeup. The plant is provided with 9,000 bbl. of water storage.

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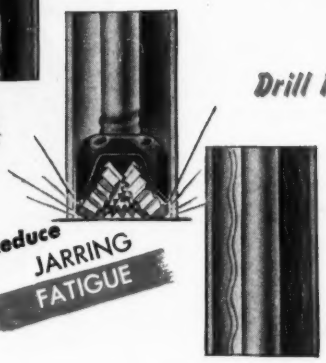

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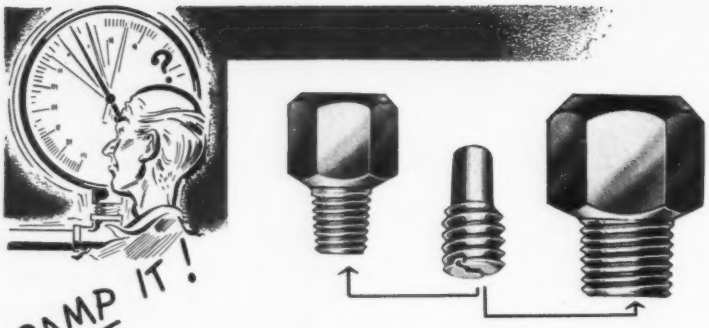

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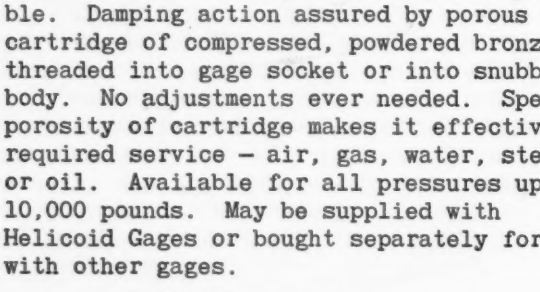

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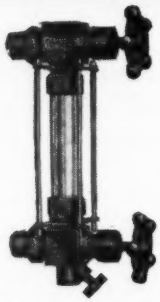

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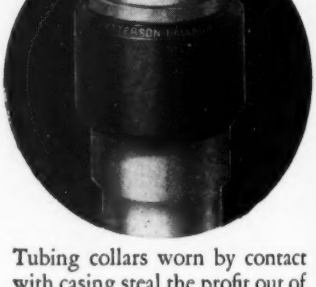

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CONVERSION OF NATURAL GAS TO LIQUID FUELS

by R. C. Alden*

ABOUT 25 years ago, Franz Fischer and Hans Tropsch of Kaiser Wilhelm Institute in Germany, commenced a systematic laboratory study of catalysts and conditions required for the efficient production of liquid and solid hydrocarbons from water gas. Water gas was already being produced commercially in Germany in tremendous quantities for use in the production of synthetic methanol and as a source of hydrogen for the ammonia synthesis, hydrogenation of coal, and other hydrogenation processes. By 1925 these two investigators had succeeded in developing an active cobalt catalyst which could be used at near atmospheric pressure to give good yields of liquid hydrocarbons.

By 1933, the first large-scale installation was on stream at Oberhausen. The Fischer-Tropsch process showed a steady rise in commercial production from this time on until the beginning of the war.

At the time of the invasion of Poland, Germany had seven large hydrogenation plants and seven Fischer-Tropsch plants operating. At least four more hydrogenation plants, including a large one at Poelitz, and two more Fischer-Tropsch plants were under construction. During the "phony stage" of the war, between September 1939 and May 1940, Germany's synthetic-oil-plant capacity was increased roughly from 13,100,000 to about 16,600,000 bbl. annually.[1]

Fig. 1 shows a flow sheet for the typical German plant of the atmospheric type.[2] This was the most common type of plant used in Germany. Only a very small percentage of Fischer-Tropsch output was produced by the so-called medium-pressure process.

Water gas for Fischer-Tropsch operation was produced universally by all plants in the Ruhr by the conventional water-gas reaction using coke. The reaction was carried out in standard, intermittent water-gas sets involving no significant differences from well-known American practice.

In order to obtain the higher ratio of hydrogen to carbon monoxide required for the standard Fischer-Tropsch operation, it was necessary to pass a portion of the water-gas through converters containing the so-called shift catalyst, whereby carbon monoxide was converted into hydrogen and carbon dioxide. This step is not shown on the flow sheet. Steam was introduced with the gas and the conversion was carried out at about 900° F. The carbon dioxide was subsequently scrubbed out and the remaining hydrogen combined with the unconverted portion of water gas to give a gas containing approximately two parts of hydrogen to one of carbon monoxide plus 8 to 10 per cent impurities or inerts such as nitrogen, methane, and carbon dioxide.

Sulfur is a troublesome element in the Fischer-Tropsch process and must be removed from synthesis gas before entering the synthesis chambers. The tolerance is about 0.1-0.2 grains per 100 cu. ft. The removal is carried out in two stages. Stage 1 is the removal of hydrogen sulfide and stage 2 the removal of organic sulfur such as carbon disulfide and mercaptans. In Germany the hydrogen sulfide was generally removed by the well-known iron oxide method consisting merely of contacting synthesis gas with iron oxide at normal temperature. Organic sulfur was generally removed by contacting the synthesis gas with a catalyst at temperatures varying from 350° F. with fresh catalyst to 540° F. with nearly exhausted catalyst. A captured sample of catalyst from the Rheinpreussen plant showed ferric oxide and sodium carbonate to be the chief constituents.

Synthesis of Hydrocarbons

The synthesis gas with sulfur removed passes into the reaction chamber where the synthesis of hydrocarbons takes place. The temperature in this converter varies with the age of the catalyst from about 356° to 383° F.; the pressure is substantially atmospheric. The catalyst chamber is cooled indirectly by circulating water. The products and unconverted gas are separated in the condenser and cooled by a water spray. Unconverted gas

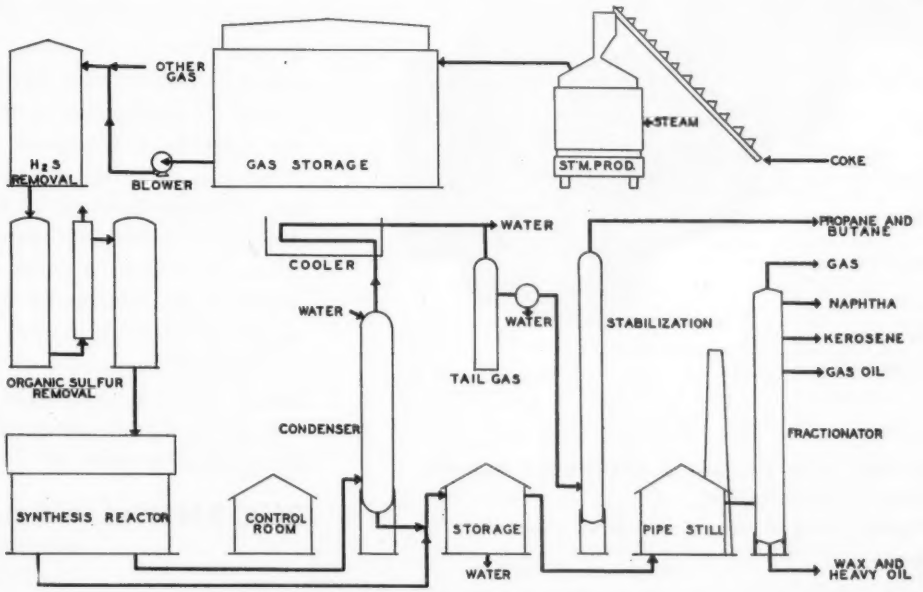

Fig. 1—Production of oil by the Fischer-Tropsch process

*Director of research, Phillips Petroleum Co., Bartlesville, Okla. Article is a slightly abridged version of a paper presented at the October 11, 1946, meeting of California Natural Gasoline Association.

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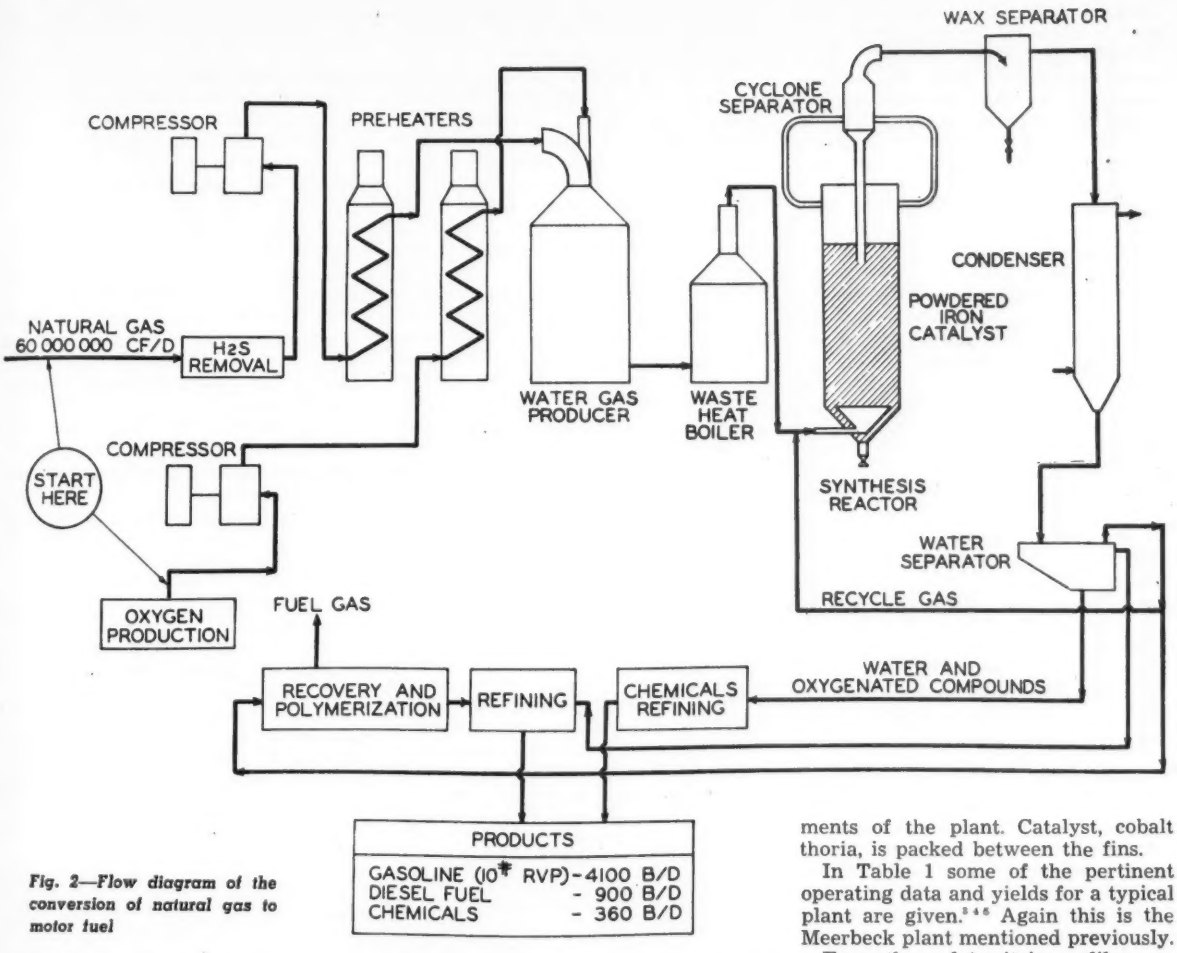


Fig. 2—Flow diagram of the conversion of natural gas to motor fuel

containing considerable light ends passes either to large vessels containing activated carbon or to a cooler where light-oil vapors and gaseous hydrocarbons are recovered. Product is obtained from activated carbon by periodical steam stripping. The heavier condensed product is separated from the water layer and is subsequently refined and stabilized by conventional methods.

The flow diagram does not illustrate vividly enough the tremendous amount of equipment required in the conventional German process. The Meerbeck plant,[3] for example, having an installed capacity of about 1,500 bbl. per day of total product, had 11 gas-separation units covering 2½ acres of land, and in addition:

Four parallel sets of hydrogen sulfide-removal towers each 30 ft. high by 35 ft. in diameter;

Five parallel sets of organic sulfur-removal towers 30 ft. high and 12 ft. in diameter;

One hundred Fischer-Tropsch reactors, each 8 by 10 by 15 ft. in size;

Two adsorption systems each containing seven towers;

Two stabilization systems;

Two distillation plants.

The heart of the Fischer-Tropsch plant is the synthesis chamber; 100 of these are required for 1,500 bbl. per day capacity. These chambers are small and complicated, designed to remove the enormous heat of reaction which is about 7,000 B.t.u. per pound of product. Each chamber consists of an array of metal fins about 0.28 in. apart. Transversely through these fins are cooling tubes about 1.5 in. in diameter through which water flows as a cooling agent. The amount of steam obtained in this manner is practically enough to supply the power requirements of the plant. Catalyst, cobalt thoria, is packed between the fins.

TABLE 1—OPERATION AND YIELDS: TYPICAL GERMAN FISCHER-TROPSCH PLANT[3,4,5]

Operation

65 first-stage converters; 35 second-stage converters
100 total converters
Gas contraction, first stage—50 per cent
Over-all gas contraction—75 per cent
Temperature—356° to 392° F.
Pressure—2 psig.

Production (Wt. per cent)

Gasoline—52.2	Heavy oil—10.7
Diesel fuel—15.8	Crude wax—11.3
Bottled gas—10.0	

Yields

Total plant yield—approx. 1,500 bbl. per day
Gal. per M.c.f. synthesis gas—1.16 to 1.6
Raw material per M.c.f. of synthesis gas: 39 lb. of coke, 159 cu. ft. of coke-oven gas.

In Table 1 some of the pertinent operating data and yields for a typical plant are given.[3,4,5] Again this is the Meerbeck plant mentioned previously.

From these data, it is readily seen that German Fischer-Tropsch plants were quite complex and actually made up of many small units. For example the daily capacity of a single synthesis unit averaged about 15 bbl. which is hardly more than pilot-plant size. The plants in general were very sparsely instrumented and necessitated the employment of large operating staffs for hand control.

Developments in America

During the last few years, progress has been steadily made in the development of these processes which will compete with crude petroleum as a source of motor fuel. The developments have now reached the point where at least two organizations have announced their intentions to construct plants to produce motor fuel. They are apparently convinced on the basis of extensive pilot-plant operation that the process is competitive with crude petroleum. For one of these plants, the Hydrocol, Inc., plant at Brownsville, Tex., the ground will soon be broken. Construction on the Stanolind Oil & Gas Co. plant, according to published announcements, is expected to start within the next 2 or 3 years. The optimistic tone with which American

versions of the Fischer-Tropsch process are discussed today indicate very strongly that these processes have come a long way from the cumbersome and expensive German process.

One of the chief advantages favoring the development of an economic process in the United States depends on the huge reserves of natural gas available. The German process centered on coal as the initial raw material merely because there is scarcely any natural gas at all in Germany. It is definitely cheaper at the present time to produce synthesis gas for subsequent conversion to liquid hydrocarbons from natural gas than from coal. There are several reasons for this. In the first place, the raw material cost of natural gas per barrel of gasoline would probably average somewhat less than that of coal. With natural gas, for example, at 5 cents per 1,000 cu. ft., its cost per barrel of gasoline produced (10,500 cu. ft. per bbl.) is approximately 53 cents. To compare favorably with this cost, the price of coal per ton would have to be about 80 cents on the basis of 1,360 lb. of coal per barrel of gasoline produced. With natural gas at 10 cents per 1,000 cu. ft., the equivalent price of coal would be $1.60 per ton. Secondly, gas is simpler and cleaner to handle and therefore less expensive to convert into synthesis gas than coal. A third advantage for natural gas over coal, is the greater ease with which desulfurization can be accomplished. Sulfur in coal passes into the synthesis gas and is thence removed. Natural gas representing about one-third of the volume of synthesis gas produced from it can be desulfurized directly in one step to remove hydrogen sulfide. The organic sulfur content of natural gas is usually sufficiently low that its removal can be dispensed with.

Another advantage, linked closely with the use of natural gas, is the much larger scale of operations justifiable in the American economy. Savings are effected by the installation of manufacturing facilities of larger capacity.

Nobody is going to set out deliberately to build enough hydrocarbon synthesis plants to use up our reserves of natural gas in 15-20 years. Such processes, if successful in large-scale operations, it is believed, will always be supplemental to some other major source of gasoline. An economic balance between the use of natural gas directly as a fuel and as a raw material for production of gasoline would ultimately be achieved. So, if these processes prove successful, it is believed that there is room for perhaps four or five large-scale plants to operate continuously for a much longer period.

Since the amount of natural gas required for a synthetic-fuel plant is so great, it is obvious that only a few locations, that is, those fields with large reserves, come into question. A 5,000-bbl.-per-day plant, for example, requires a total of 50 to 70 million cubic feet of natural gas per day depending upon which published figures are used. Over a period of operation of 20 years this amounts to 365 billion to 510 billion cubic feet. It is not improbable, however, that in the event that synthetic-fuel plants prove successful, pipe lines will be laid for considerable distances to bring in gas requirements. The most important fields that come into consideration are those of western Kansas, East Texas, North Texas, and California.

To sum up the position of natural gas with respect to liquid-hydrocarbon synthesis: natural gas will probably become a supplementary source of motor fuel in the near future and a modest number of plants will probably operate competitively with petroleum. Its use represents an intermediate but important process and as such has greater immediate interest than coal.

Concrete Developments

And now to leave the field of conjecture and to return to a discussion of the very concrete developments in the conversion of natural gas to liquid fuels, which have given the process a real commercial significance.

Gas, similar to synthesis gas, but containing more hydrogen and less carbon monoxide, has been produced commercially from natural gas and steam in this country for quite a few years. This gas, which contains about 70 per cent hydrogen, 20 per cent carbon monoxide, and 10 per cent of inerts such as carbon dioxide, nitrogen, and residual methane, is currently being used as a source of hydrogen in various industrial processes such as the synthetic ammonia and methanol processes and the hydrogenation of petroleum stocks. The carbon monoxide is oxidized in a subsequent step to carbon dioxide which is scrubbed out leaving substantially pure hydrogen. The gas is produced in multitube gas-fired reactors, each tube being about 3 in. in internal diameter and filled with nickel catalyst. These units operate at about 1,600° F. and, therefore, the tubes are made of expensive alloy steel. Tubes of small diameter are used in order easily to supply the heat required to maintain reaction temperatures, for the reaction is highly endothermic. This process can be modified to produce synthesis gas having a ratio of hydrogen to carbon monoxide of 2/1 by introducing carbon dioxide as well as steam and natural gas into the conversion unit. The combined reaction may be represented as the sum of two separate reactions as shown:

$$2CH_4 + 2H_2O \rightarrow 6H_2 + 2CO$$
$$CH_4 + CO_2 \rightarrow 2H_2 + 2CO$$
$$3CH_4 + 2H_2O + CO_2 \rightarrow 8H_2 + 4CO$$

This method of operation for synthesis-gas production with multitube reactors is relatively costly but has found considerable commercial application where the final product sells, such as synthetic ammonia, for a fairly good price, or where the amount of gas required per unit of finished product is relatively small, such as in the case of hydrogenation of petroleum stocks. But for the process of producing motor fuel directly from such gas, in which case about 30,000 cu. ft. of synthesis gas per barrel of product are required, the cost is high.

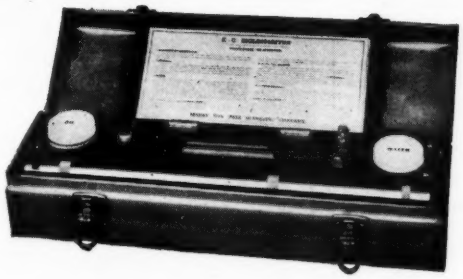
One alternative method for making synthesis gas which is now being used in pilot-plant operation in this country depends on the use of pure oxygen. Before the war, the idea of using pure oxygen in large quantities for industrial purposes was wishful thinking. The cost was far too great. During the war, however, at least two improved low-temperature fractionation processes for obtaining oxygen from air were developed. The improvements are chiefly concerned with higher thermodynamic efficiencies in low-pressure operation of adiabatic expansion engines. Used in conjunction with a synthetic fuel plant the cost of oxygen is now claimed to be as low as 5 cents per 1,000 cu. ft. This figure includes practically no power costs since sufficient power is obtained by production of steam in the hydrocarbon-synthesis step.

The production of synthesis gas from natural gas and oxygen can be represented by the following equation:

$$CH_4 + \tfrac{1}{2} O_2 \rightarrow CO + 2H_2$$

The theoretical amount of oxygen required is seen to be one-half the volume of methane. The reaction temperature is high, about 2,100° F. But the reaction has one decided advantage over the carbon dioxide-steam-natural gas reaction, previously mentioned, namely that it is exothermic instead of endothermic and, therefore, once the reactants are preheated to temperatures considerably below reaction temperature, the reaction commences and supplies its own heat to bring the temperature up. Small-diameter reaction tubes are not necessary in this process; the reaction proceeds in specially designed large-diameter reactors. A nickel catalyst may be used, if desired, to promote the reaction, although the reaction will take place without catalysts. The reaction may be conducted at atmospheric pressure or at higher pressures. It is desirable to operate at a pressure equal to that employed in the subsequent synthesis step (150-250 psi.) in order to eliminate compression of the synthesis gas which is approximately twice the volume of the reactants. Natural gas can usually be supplied from pressure distillate oper-

(Continued on page 97)



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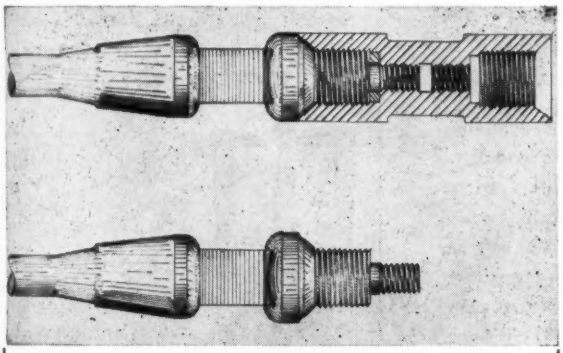

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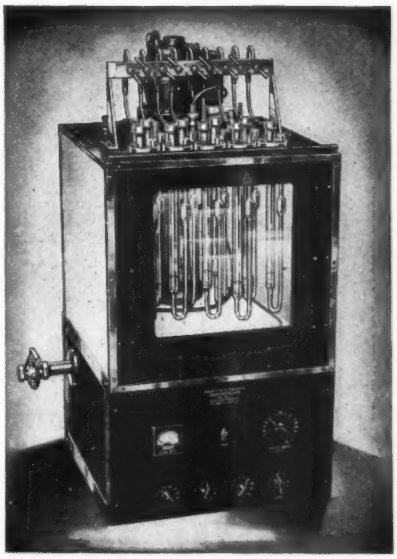

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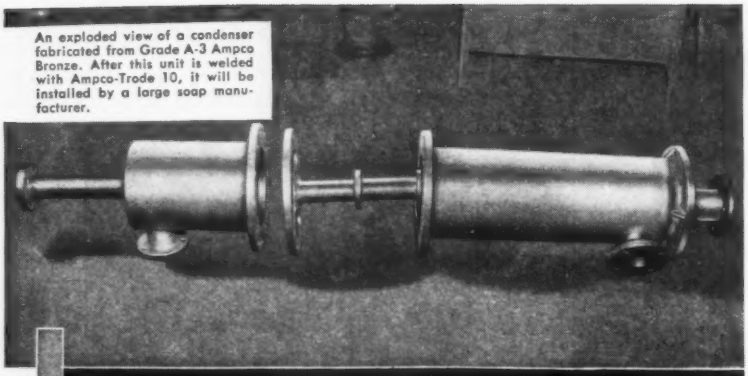

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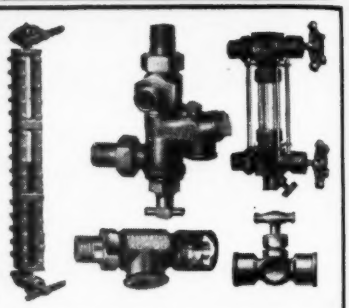

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Miniature Models Aid Mapping Of Salt-Dome Areas

. . . Replicas Made to Exact Scale

P. H. O'Bannon, Humble geologist who constructed that company's first salt-dome peg model. He is now Humble's division geologist at New Orleans

TO keep "track" of the hundreds of known salt domes in the Gulf coastal area, as to size, shape, and other details, the scale peg-map approach for one part has been used by the exploration department of Humble Oil & Refining Co. The results, as pictured here, present a mass of details in a simplified form easily grasped from the over-all viewpoint.

Start of this work by Humble goes back 15 years when Humble geologist P H. O'Bannon started manufacturing in his spare time these miniature salt-dome replicas from soft pine with a pocket knife, saw, sand paper, and paint brush. The salt-dome models were made to the exact shape and size of all known salt masses in the Gulf Coast area. Bullet-shaped domes, slender spines, overhangs—all the peculiar characteristics of salt plugs—he has translated into his minute pegs. The finished map was executed from interpretations of all available drilling and geophysics information, and was designed to give something of an X-ray view of the earth's first 20,000 subsurface feet. The model pictured is 10 ft. long, 4 ft. wide, and mounted 2 in. under glass.

Vertical scale of the map is 1 in. for every 10,000 ft. in depth; horizontal scale is 1 in. for every 4 miles. Boundary outlines are marked on the base map as well as on the glass covering, giving the illusion that the first 20,000 ft. of the earth has been simply stripped away to leave the naked salt domes.

First Map Completed in 1930

The first map was completed by O'Bannon in 1930 and proved popular, not only for reference work but also for exhibition. It was used in meetings and in special displays, and several years ago when it was damaged beyond repair while being transported, he immediately began work on a new map which was completed some months ago. All pegs are painted in a gray color corresponding to that of actual salt drill cuttings; the tops are painted black to represent the thickness of cap rock, or yellow to indicate that they are producing or have produced oil or sulfur. The pegs are cemented to the map and remain in position whether the map is drawn up against the wall or standing on its portable legs to form a table.

A similar but more comprehensive map, fashioned after O'Bannon's original creation, was recently completed by L. J. Droddy, Al Kaeppel, and Earl Chase of the scouting section of the exploration department. The new map covers more territory, including all known piercements of salt domes in the Gulf coastal area of the United States. In addition to salt deposits, surface geological formations are indicated by different colors.

L. J. Droddy and Al Kaeppel of Humble's exploration department, study O'Bannon's original salt-dome peg map preparatory to building another more extensive edition. The latter will include surface geology

Tests at Cycling Project Demonstrate Possibilities of New Corrosion Inhibitor

by W. H. Justice* and Edward N. Jones†

THE gas-condensate wells of the West Tuleta field, Bee County, Texas, are completed in the Slick sand of the Wilcox formation at a depth of 7,520 ft. The 3,200-acre West Tuleta field is unitized and is operated for the leasehold owners by Dirks Brothers. There are five producing wells and one injection well in this field. The gas from this field is being cycled at the rate of 20,000,000 cu. ft. per day. The gas produced is processed and the residue gas returned to the reservoir by the Gasoline Products Corp. cycling plant.

Bottom-hole pressure at present averages 2,950 psig. and the bottom-hole temperature is 230° F. Average flowing casing pressure is 2,250 psig. and the flowing tubing pressure is 2,100 psig. with a well-head average temperature of 157° F.

The gas produced contains 61 bbl. of butane-and-heavier condensate per million cubic feet, of which approximately 25 per cent or 15 bbl. per million cubic feet of gas is in the liquid phase at well-head temperature and pressure. There is at well-head conditions an additional 10 bbl. of liquid per million cubic feet of gas. This liquid consists of methane, ethane, and propane dissolved in the butane-and-heavier condensates, so that the total liquid phase at well-head conditions is approximately 25 bbl. per million cubic feet of produced gas. The produced gas contains 2.1 per cent of carbon dioxide.

*Tide Water Associated Oil Co., Houston.
†Consulting engineer, Pettus, Tex.

This paper, presented before the Natural Gasoline Association of America's Corrosion Research Project Committee at its quarterly meeting in Dallas, was received with considerable interest as a possible solution to the problem of finding a suitable inhibitor to prevent corrosion in gas-condensate wells. Intensive testing of Kontol 115 is projected in other fields.

The produced gas contains 16 gal. per million of water in the liquid phase at well-head conditions. An average analysis of the water separated and removed from a well-head trap in this field was as follows:

	P.p.m.
pH	5.8
Iron	43.0
Chloride (as NaCl)	46.9
Calcium (as $CaCO_3$)	65.0
Sulfate	Trace
Total solids	199.0

History of Corrosion in Field

The gas produced from the field has been found to be very corrosive. Corrosion was so severe that it has been necessary to replace wing valves, thermometer wells, choke tips, and other surface equipment at frequent intervals. All of the wells have had to be worked over to remove and replace the tubing strings because of serious internal tubing corrosion in the top 3,500 ft. Most of the corrosion has been found to take place within 18 in. of the collars on the inside of the tubing. It has been necessary to work over the wells to replace corroded tubing approximately every 18 months at a cost of from $10,000 to $15,000.

Choice of Chemical Inhibitor

We were looking for an inhibitor that would "selectively wet" the steel of the casing and tubing so that the acidic water produced could not attack this equipment. We desired an inhibitor that did not raise the pH of the produced acidic water so that any calcium or magnesium contained in the water would not be precipitated as a plug in the formation or as a plugging scale in the well tubing. We thought that it would be desirable for the inhibitor to be oil soluble so that it could be injected into the annulus of the well without danger of plugging the producing formation. In talking to an engineer with Tretolite Co., he suggested that their new corrosion inhibitor Kontol 115, developed during the war for the Navy, might meet these requirements. After extensive laboratory test, this material was found to have the following properties. It is a semipolar organic reagent which is chemically attracted to metal surfaces. The adherent, invisible protective film thus formed inhibits the attack of the metal by corrosive materials. This material is completely oil soluble and has no tendency to form precipitate with magnesium and calcium salts. With

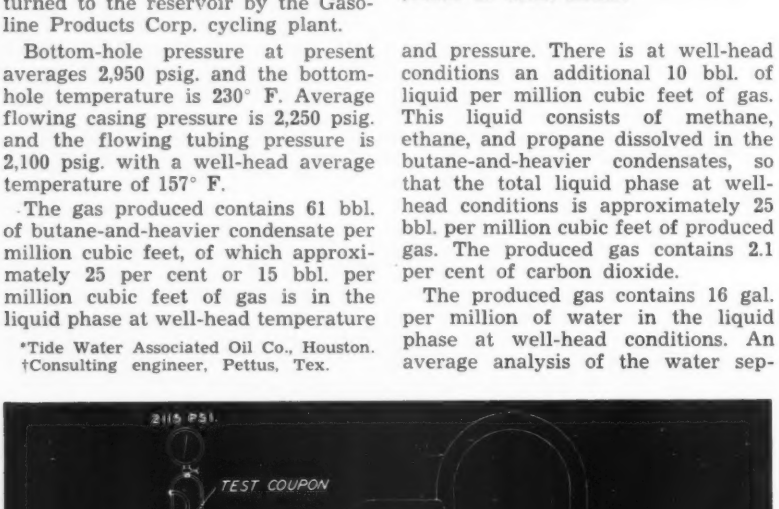


Fig. 1—Details of chemical feeder hookup and corrosion coupon holder. Also illustrated is the path traveled by the chemical injected into the casing of the test well

the approval of the field engineering committee and the field operating committee, we arranged with Tretolite Co. for a cooperative field test to be conducted in the West Tuleta fields.

Details of Field Test

The 1 Harris well was selected as a typical corrosive well of the West Tuleta field. This well had suffered two tubing failures in 35 months due to severe internal tubing corrosion. A third string of J-55 2⅜-in. external upset tubing had recently been installed. Well record is given in Table 1.

The corrosion rate of the well was first established by installing two weighted freshly sand-blasted mild-steel coupons in the well stream for a 2-week test period (see Fig. 1 for details of coupon and coupon holder). The coupons were removed at the end of the 2-week period and accurately reweighted to determine the percentage of weight loss. Iron content of the water separated from the gas in a flow-line trap was determined each day of the test. Gas produced from the well was kept at a constant rate and the volume of gas and the flowing temperature and pressure were recorded daily. The iron content of the water produced from another well in the field was determined regularly to confirm the daily iron-content-analysis method.

TABLE 1—WELL RECORD, 1 HARRIS, WEST TULETA FIELD, BEE COUNTY, TEXAS

Date completed—	10-18-43
Elevation, d.f., ft.	319
Elevation, g.r., ft.	305
Total depth, ft.	7,758
Casing set, ft.	7,693
Kind of casing, lb.	J-55, 17
Size of casing, in.	5½
Tubing set, ft.	7,470
Size of tubing, in.	2⅜
Surface pipe, ft.	1,200
Size of surface pipe, in.	10¾
Depth of perforation, ft.	7,490-7,530
No. of perforations	240

After the corrosion rate had thus been established the effectiveness of the inhibitor was determined by injecting a constant volume of the chemical down the annulus of well with a chemical pump and determining the rate of corrosion of the test coupons inserted in the well stream for a similar 2-week test period (see Fig. 1 for chemical feeder hookup and also for path of travel of chemical injected into the casing annulus). The reduction of the iron content of the produced water was determined daily as a further check on the effectiveness of the inhibitor. Gas produced during the various test was kept as near constant rate as possible and the volume of the gas and the flowing temperature and pressure were recorded daily. The minimum amount of inhibitor required to protect the well was determined by reducing the volume of inhibitor injected in the well and measuring the comparative corrosion rates with test coupons and iron determinations on the water, as outlined above.

Results of Field Test

Results are summarized in Table 2. It is to be noted that tests Nos. 4 and 5 indicate that some of the inhibitor injected into the well in test No. 3 was still effective during these tests. There was sufficient residual corrosion inhibitor effect to reduce the corrosion rate during these tests to 50 per cent of the original corrosion rate as established in test No. 1. To be sure that the iron-determination method was giving constant results the iron content of the water from a well that had not been inhibited was run weekly and found to average 43 p.p.m.

The detailed results of the seven field tests are shown graphically in Fig. 2. The description of the iron-determination method is given in Table 3.

All the producing wells in the field are now being protected by the use of this inhibitor.

Iron content of the produced water

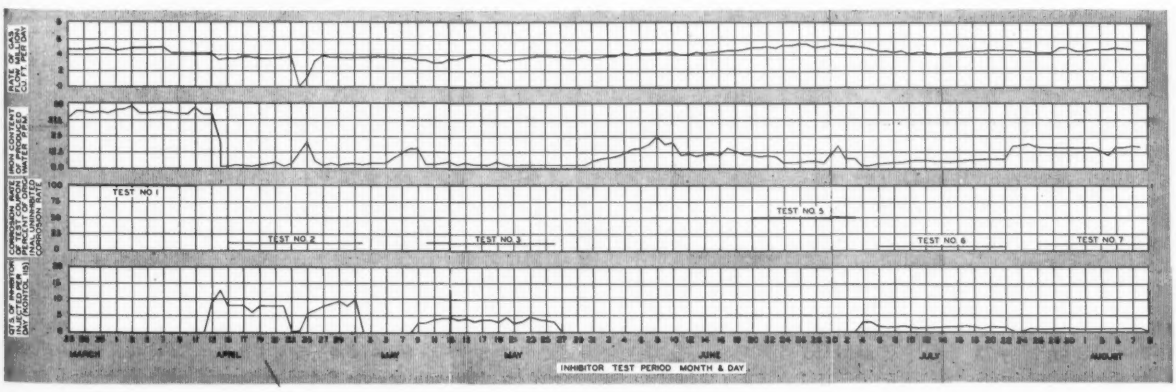
(Continued on page 100)

TABLE 2—SUMMARY OF CORROSION INHIBITOR TESTS, 1 HARRIS, WEST TULETA FIELD, BEE COUNTY, TEXAS

Date of test—	Test No. 1 3-26 to 4-11	Test No. 2 4-15 to 5-2	Test No. 3 5-9 to 5-27	Test No. 4 5-30 to 6-20	Test No. 5 6-20 to 7-3	Test No. 6 7-6 to 7-26	Test No. 7 7-26 to 8-8
Length of test period, days	16	17	16	20	14	16	14
Daily average gas volume, M.c.f./day	4,630	3,404	3,777	4,100	5,403	4,176	4,550
Daily average volume of inhibitor Kontol 115, qt./day	None	8	4	None	None	1.75	0.9
Ratio volume of inhibitor to gas volume, qt./M.M.c.f.	None	2.35	1.06	None	None	0.419	0.2
Approximate cost of inhibitor per day	None	$4.00	$2.00	None	None	$0.87	$0.45
Approximate cost of inhibitor, $ per M.M.c.f. of gas per day	None	$1.17	$0.53	None	None	$0.21	$0.11
Average iron content of produced water, p.p.m.	43	3.4	2.2	11.13	7.6	4.9	15.0
Average loss in weight of test coupons, grams	1.4591	0.1741	0.1290	(*)	0.7438	0.0942	0.1258
Inches per year penetration	0.0350	0.00393	0.00310	(*)	0.0204	0.00226	0.00345
Corrosion rate of test coupon, per cent of original uninhibited corrosion rate	100%	12%	11%	(*)	50%	7%	9%

*Coupons were not weighed immediately after test and were subject to atmospheric rusting. Weights losses of these coupons were disregarded. Although iron content of produced water indicates that there was sufficient residual corrosion inhibitor effect to reduce the original corrosion rate.

Fig. 2—Charted results of corrosion inhibitor tests at 1 Harris, West Tuleta field, Bee County, Texas



Dry-Oil Recovery for Uniform Distribution of Pay

*by Park J. Jones**

OIL PRODUCTION *by water*

PART 2 OF A SERIES

THE oil recoverable before edge water appears in production varies with a number of factors including the distribution of pay. This article is limited to uniform areas per foot of dip distance and to uniform pay thickness. For such structural and stratigraphic conditions, the acre-feet of pay invaded by water per foot of updip advancement is uniform. The in-place oil varies with porosity, interstitial water, and volume factor. The recoverable oil depends on the fluid factor. The latter varies with the volume factor for oil and with the viscosity ratio of reservoir liquid to that of water. The oil displaced ahead of water in a given reservoir depends on the distance advanced by water before reaching producing wells. Two contours called B and M are used in estimating producing rates. The structural position of the B and M contours varies with time.

Reservoir Space

A CHARACTERISTIC of reservoirs called reservoir space is defined by

$$S = 7758ahf\,(1 - W) \qquad (1)$$

where

a = productive area, acres
h = average pay thickness in feet for the "a" acres
f = average porosity expressed as a fraction of "ah"
W = average interstitial water content, fraction of porosity
S = reservoir space, barrels.

Reservoir space is occupied by hydrocarbons. Hence the symbol S could denote barrels of hydrocarbons. But reservoir space may decrease during the productive life of a reservoir. Encroaching water and injected gas, or water, decrease reservoir space. The evolution of gas upon reduction of pressure decreases the space occupied by a reservoir liquid. Reservoir space and barrels of hydrocarbons are numerically equal only under certain conditions.

The Fluid Factor

The fluid factor for displacement of oil by water is defined by

$$F = \frac{b\mu_L}{\mu_w} \qquad (2)$$

where

b = volume factor for oil, barrels of space per barrel of oil
μ_L = viscosity of reservoir liquid, centipoises
μ_w = viscosity of water, centipoises
F = fluid factor, no dimensions.

A barrel of oil may occupy anywhere from 1.1 up to 3.0 bbl. of space under the conditions of reservoir pressure and temperature. This space is denoted by the volume factor b. Volume factors for oil vary[1] with the composition of oil, cubic feet of gas in solution, and with the methods used to separate gas and oil.

A hydrocarbon liquid in a reservoir is called reservoir liquid. The viscosity of reservoir liquids ranges from less than 1 to more than 10 centipoises. The viscosity of water is commonly less than 1 centipoise at reservoir temperature. The volume factor for water is assumed to be one, that is, a barrel of water measured at 60° F. and 14.73 psia. is said to occupy 1 bbl. of space at reservoir pressure and temperature.

The In-Place Oil

The barrels of oil in place per acre-foot of pay containing no free gas is defined by

$$p = 7758f\,(1 - W)/b \qquad (3)$$

where p is barrels of oil per acre-foot and the other symbols have the meaning given in Equations 1 and 2.

If a reservoir contains no free gas, the barrels of oil in place for the reservoir as a whole is given either by S/b or by (pah).

Maximum Recovery From a Section

The maximum oil recovery by water from a section of pay is not likely to exceed the recovery defined by[2]

$$U_o = 80 - F \qquad (4)$$

where U_o is in per cent of in place oil and F is the fluid factor.

The difference (100 — U_o) or (20 + F) per cent of in place oil cannot be displaced by the water velocities commonly found in practice. So (20 + F) per cent is nonrecoverable oil and (80 — F) is recoverable oil aside from free gas and unusual water velocities.

Suppose water displaced all the recoverable oil (80 — F) from a given section, or acre-foot, of pay. The production from such a section, or acre-foot, is oily water. The water cut is on the order of 100 per cent. Wells completed below a section of maximum recovery produce oily water. The cut is practically 100 per cent.

Breakthrough Recovery for a Section

The oil displaced from a section of pay just invaded by water is on the order[2]

$$U_b = 28 - F \qquad (5)$$

where U_b is in per cent of in place oil and F is the fluid factor. The recovery defined by Equation 5 is called the breakthrough recovery.

The oil displaced from a given section of pay in excess of the breakthrough recovery (28 — F) is likely to be accompanied by water. Consider a given section, or acre-foot, of pay. The production is dry until the recovery reaches about (28 — F) per cent of in-place oil. The water cut increases from zero at (28 — F) up to 100 per cent water at the maximum recovery

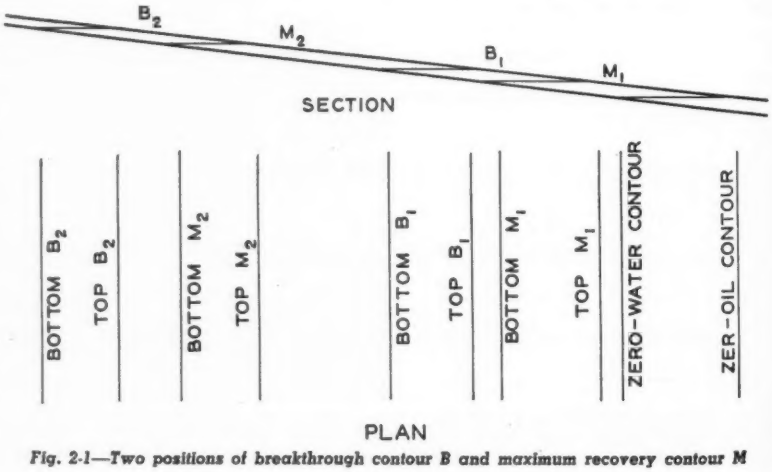


Fig. 2-1—Two positions of breakthrough contour B and maximum recovery contour M

*Production consultant, Houston.

(80 — F). The barrels of water required to increase the recovery from (28 — F) up to (80 — F) for a given acre-foot of pay is many times the barrels of oil displaced.

The B and M Contours for Edge Water

Oil may be displaced by edge water, bottom water, or injected water. Regardless of the source of water, oil is displaced by an advancing oil-water interface. There is no water, other than interstitial water, ahead of an oil-water interface.

The elevation of an oil-water interface and the distance advanced by an oil-water interface will be denoted by a contour called the B contour. The elevation of a B contour varies with time. The distance advanced by a B contour will be measured along the top of pay. Since the B contour defines the position of an oil-water interface, it is called the breakthrough contour.

Fig. 2-1 illustrates two positions of an advancing oil-water interface. The lowest horizontal line in the section shows the initial water level. The water contact, or zero-oil contour, is relative to the top of pay. The zero-water contour is relative to the bottom of pay. The region between the zero-water and zero-oil contours is said to have bottom water. The area of, and acre-feet of pay within, the region having bottom water varies with dip and pay thickness.

The barrels of oil recovered from a reservoir is equal to the barrels of oil displaced by water. Production of oil by gas and expansion of reservoir liquid is not included in the cumulative recovery by water displacement. The barrels of oil displaced by water may be expressed as the product of in-place oil, acre-feet of pay invaded by water and the displacement factor.[2] Accordingly,

$$U = p(ah)m \qquad (6)$$

where

U = recovered oil, barrels

p = in-place oil, barrels per acre-foot

ah = acre-feet invaded by water

m = displacement factor, fraction of in-place oil.

The oil displaced ahead of water in barrels per acre-foot increases with the distance advanced by water. The limiting values are (28 — F) and (80 — F) per cent of in-place oil.

Oil recovery from the acre-feet of

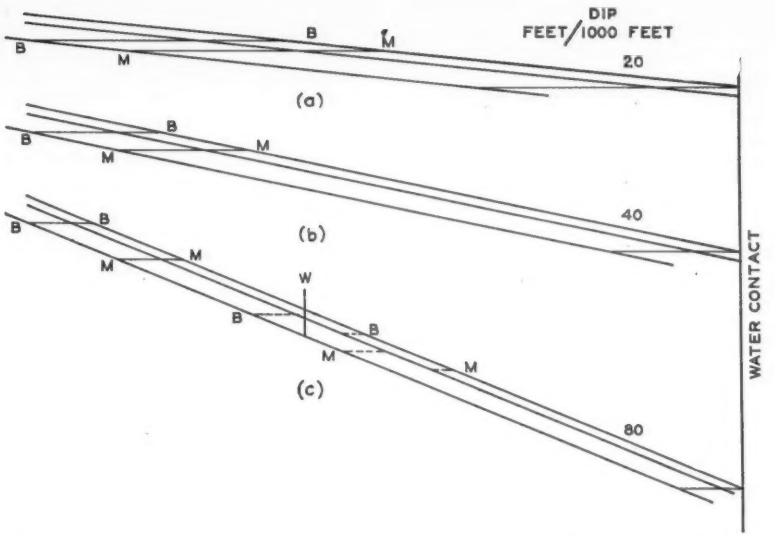
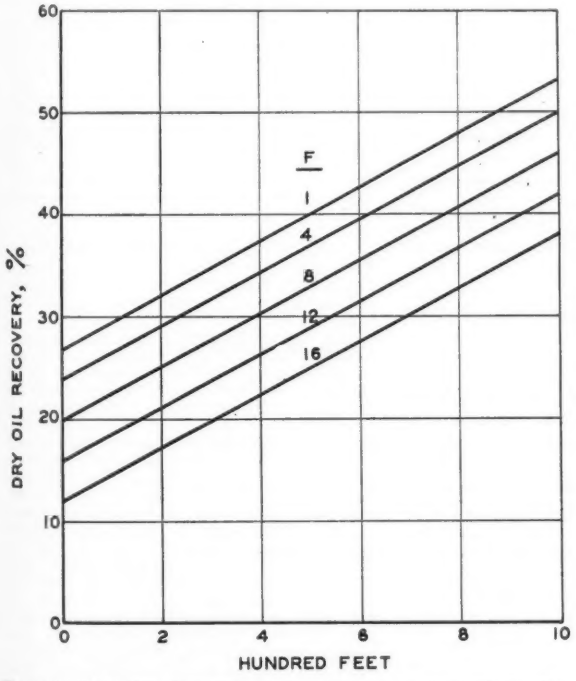


Fig. 2-2—Illustrating the elevation of M contours relative to B contours in dip sections of linear reservoirs having a uniform 20 and 40-ft. pay thickness; the vertical scale is exaggerated five to one; the horizontal distance between B and M contours along the top of pay is about 1,000 ft.



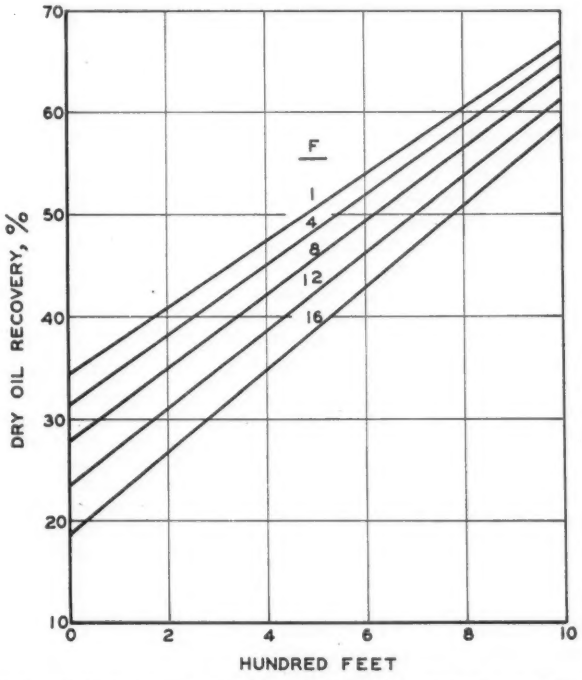


Fig. 2-3—(Left) Dry-oil recovery in per cent of in-place oil vs. distance moved by water and fluid factor F. Fig. 2-4—(Right) Dry-oil recovery in per cent of recoverable oil vs. fluid factor F and distance advanced by an oil-water interface in reservoirs having no convergence of reserve

pay below an M contour is (80 — F)p barrels per acre-foot. However, if some oil is trapped structurally or stratigraphically, the oil recovery from the acre-feet below an M contour would average less than (80 — F)p barrels per acre-foot. Similarly, if water bypasses some oil because of excessive rates of production, the oil recovery from the acre-feet below an M contour would average less than (80 — F)p.

Cumulative oil recovery from a reservoir may be expressed as follows:

$$C = 0.01p\,[(80 - F)\,V_m + mV_b] \quad (7)$$

where

C = cumulative recovery, barrels
V_m = acre-feet of pay below an M contour
V_b = acre-feet of pay within a B-M region
m = displacement factor, per cent of in-place oil.

The barrels of oil defined by Equation 7 is the volume of oil displaced ahead of water provided no oil is produced from the region below a B contour. All the oil C is recoverable as dry oil if no water is produced, that is, wells are completed above the level of the B contour.

No Convergence of Reserve

Suppose the distribution of productive area and pay thickness are such that the acre-feet of pay per foot of updip-water advancement is independent of structural position. Under this condition, there is no convergence of oil reserve. The acre-feet of pay per foot of updip water advancement is uniform. The sections in Fig. 2-2 are diagrammatic illustrations for no convergence of reserve.

Let M denote the elevation at a given time of the contour below which all the recoverable oil has been displaced by water. Wells completed below an M contour produce water. Oil recovery from the acre-feet of pay below an M contour is about (80 — F) per cent of the in-place oil.

Let B denote the elevation of the oil-water interface corresponding to a given M contour. Wells completed above a B contour produce dry oil. Wells completed between a given set of B and M contours produce oil and water. For no convergence of reserve and no production of water from the acre-feet of pay between a given set of B and M contours, the distance from M to B along the top impermeable break of a given pay interval is on the order of 1,000 ft.[2]

The oil displaced from a given B-M region varies from about (28 — F) at the B level up to (80 — F) at the M elevation. For no convergence of reserve and no production from a B-M region, the oil displaced from a B-M region averages about (54 — F) per cent of the in-place oil. The acre-feet of pay within a given B-M region varies with migration of oil. For 100 per cent migration, that is, no production from a B-M region, the elevation of a B contour relative to a given M contour varies with dip.

For no updip oil migration, that is, no oil production above the elevation of a B contour, the elevation of a B contour does not change with time. Hence, if oil and water are produced from a B-M region, the elevation of the M contour approaches the elevation of its B contour. The acre-feet of pay between the B and M contour decreases with time. However, an M contour could not reach its nonadvancing B contour by production from some practical number of wells.

Impermeable Breaks and Gravity

Probably all large reservoirs have several impermeable breaks over a substantial portion of their initially productive area. Consequently, most reservoirs have two, or more, individual pay intervals. The latter may be interconnected at some points in a reservoir by virtue of stratigraphy and usually are interconnected via well bores. Fluids can migrate around an impermeable break and across impermeable breaks via well bores.

Water may encroach at unequal rates as between two pay intervals. A well located as at W in Fig. 2-2(c) would produce oil and water from the lower pay and oil only from the upper pay. But if the well were completed in the upper pay only, the production would be dry oil until the B contour reached the well. When the M contour in the lower pay reaches the top of the well, production from the lower pay is all water. Oil production from the upper pay could be stopped by virtue of the faster rate of water encroachment in the lower pay. It is advantageous to produce oil at equal rates of water encroachment by not exceeding the MER, the maximum efficient rate.[3] For rates of B contour advancement equal to, or less than, 200 ft. per year along the top of pay, water tends to advance in a horizontal plane within a given pay and between two or more interconnected pays. Gravity levels interconnected water but requires time to do so.

Dry Oil and Distance

If producing wells are completed above an advancing B contour, the dry oil recovered aside from expansion is equal to the oil displaced by water. Let D equal the distance along the top of a pay from the water contact to a B contour at a given time. The oil displaced and therefore the cumulative dry oil recovery from the acre-feet below a B contour is defined by

$$m = (28 - F) + \frac{26D}{1{,}000} \quad (8)$$

where m is in per cent of in-place oil and D is equal to, or less than, 1,000 ft. The lines in Fig. 2-3 are solutions of Equation 8 for fluid factors ranging from 1 up to 16.

The data of Fig. 2-3 are in terms of in-place oil. But for production purposes, it is advantageous to express oil recoveries in terms of recoverable oil. The data in Fig. 2-4 show the effect of the distance moved by water on dry-oil recovery expressed in per cent of recoverable oil. Anywhere from 60 up to 67 per cent of recoverable oil could be produced as dry oil if water advances 1,000 ft. before any water is produced. These recoveries are for the region invaded by water. If water advances more than 1,000 ft. before any water is produced, the recovery for an invaded region increases because of the 100 per cent recovery from the region below an M contour.

The foregoing considerations are relative to uniform area and pay thickness. But most reservoirs have a variable area per foot of dip distance and the pay thickness usually varies with structural position. The oil displaced ahead of water in such reservoirs will be considered in the next article.

References

1. The Oil and Gas Journal, February 10, 1945, p. 99.
2. Ibid, October 20, 1945, p. 147.
3. Ibid, September 15, 1945, p. 81.

BOOKS

FUELS AND FUEL BURNERS. By Kalman Steiner. McGraw-Hill Book Co., New York. 394 pp. $4.50.

This volume presents a comprehensive compilation of the nature, occurrence, and properties of fuels from the viewpoint of domestic and commercial heating, and the design, construction, installation, and operation of stokers, oil burners, and gas burners used in heating plants. Included is a chapter on wood fuel prepared by the U. S. Forest Service. A feature of the book is a rather complete discussion of automatic-control methods and apparatus for heating systems, including conventional electrical types and the more recent electronic developments.

PETROLEUM PRODUCTION ENGINEERING OIL-FIELD DEVELOPMENT. Third Edition. By Lester Charles Uren. McGraw-Hill Book Co., Inc., New York. 1946. 764 pp. $7.00.

This is a complete, systematic, orderly, and well-balanced treatment of every phase of petroleum production engineering up to the point at which the wells are ready to produce. It introduces the fundamentals of field locations and covers thoroughly the problems, methods, and equipment of oil-field development and modern deep-well drilling. In preparing this new edition, the author has rewritten most of the material and has added many new features to cover recent developments in the technology of oil-field practice. A feature of the book is the list of visual aids—motion pictures and film strips—correlated with the material in the text. The author's chief purpose in preparing this book and its companion volume entitled "Oil-Field Exploitation," has been to provide a text or work of primary reference for petroleum-engineering students in that part of their curriculum which pertains to the technology of oil-field development and petroleum production.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Will Water Treatment Pay?

The tubular coolers on our new unit are being designed for water velocities of only 3 ft. per second. The material on the other side enters at 225°-325° F. At such a low velocity is it economical to treat the water? The unit will be shut down at 9 months to a year for cleaning and inspection and the water outlet temperature will be 130° F.—J. P.

Velocity is of some significance but the properties of the water are of much greater significance. If the water carries large amounts of suspended solid matter, a velocity above 3 ft. per second will be effective but the fouling factor of treated or clean water is less affected by velocity. Lack of specific information about the water and about the kind of oil service on the other side of the exchanger makes it impossible to give a specific answer. However, since the cost of pumping water is little increased by pumping at 6 ft. per second as compared with 3 ft. per second, it would usually be advisable to use a higher water velocity regardless of whether or not the water is treated. The need of a higher velocity is slightly more important with untreated than with treated water. According to The Refiner's Notebook No. 94 of May 25, 1946, average fouling factors for water are as follows:

Velocity 3 ft. per sec.:	
Average river water	4.0
Treated water	1.6
Velocity 6 ft. per sec.:	
Average river water	3.0
Treated water	1.3

If these fouling factors are used with an oil-film rate of 125, water-film rates of 700 and 1,200 (for 3 and 6 ft. per second) and an oil-side fouling factor of 2, the over-all transfer rate will be approximately as follows:

3 ft. per sec.:	
Treated water	77
Average river water	65
6 ft. per sec.:	
Treated water	83
Average river water	73

The differences in these rates are not large but over a period of a year and when handling 10,000,000 B.t.u. or more per hour, the extra capacity would be significant. At the end of a 9-month run the transfer rates shown above would be greatly reduced, perhaps to values as low as 35-40, particularly with the untreated water.

Water scaling tends to occur if the temperature of the metal wall exceeds about 157° F. Under the above conditions, the hot ends of the exchangers would be at the following temperatures:

3 ft. per sec.:	
Treated water	198° F.
Average river water	234° F.
6 ft. per sec.:	
Treated water	180° F.
Average river water	212° F.

These high temperatures exist at only the water outlet but large portions of the surface will be hotter than 157° F. and will tend to accumulate scale. The entire surface will be scale forming when using untreated water but only about two-thirds of the surface will accumulate scale when treated water is used.

Finally, the optimum "water-exit" temperature has been studied by A. P. Coburn and a chart is presented on page 44 of Standards of Tubular Exchanger Manufacturers Association (366 Madison Ave., New York) by which it can be computed. The method presented, although theoretically sound, has a serious shortcoming. Not only does it require detailed knowledge of the cost of cooling water but it involves the over-all transfer rate and the "annual cost of heating surface" both of which are intimately related to the outlet temperature. Thus, the amount of scaling (and hence the transfer rate) and the cost of removing the scale (a part of the annual surface cost) are vitally dependent on the outlet temperature, and hence not much can be had from the method.

Density of Natural Gas

What is the density of California natural gases?—D. L.

At pressures up to about 60 psig. it is customary to compute the density of natural gases by the perfect-gas-law equations and to assume that the pound molal volume is 379 cu. ft. per pound mole at 60° F. and 14.7 psia.

At higher pressures a deviation factor must be applied to the gas-law equation. This factor, often called the compressibility factor, has most often been correlated by the use of reduced temperatures and reduced pressures as on page 112 of the second edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., N.Y.). One of the most recent presentations of such a chart is that of W. C. Edmister before the California Natural Gasoline Association and published in the Petroleum Engineer, page 79, March 1946. If density alone is required, charts for ethane, propane, butane, and pentane, ranging in temperature from 0° to 1,200° F. and in pressure from 20 to 50,000 psia., are presented in the 1946 issue of the Technical Manual of the Natural Gasoline Supply Men's Association (Tulsa). The thermodynamic properties of various pure hydrocarbons have been published in the following references:

(1) Methane — Edmister, W. C., Thermodynamic Properties of Methane, I.E.Ch. 28, 112 (1936).

(2) Ethane — Sage, Webber and Lacey, XVIII Thermodynamic Properties of Ethane, I.E.Ch. 29, 658 (1937).

(3) Propane — Stearns and George, Thermodynamic Properties of Propane, I.E.Ch. 35, 602 (1943).

(4) Butanes — Dana, Jenkins, Burdick and Timm, Refrigeration Engineering, Vol. 12, No. 12, pg. 403, June 1926.

Excess Air For Boilers

How much excess air should be used for a boiler?—F. E. C.

The amount of air required to burn a fuel completely to carbon dioxide and water vapor is small but in order to maintain maximum steam output, insure complete combustion, avoid smoke, avoid overheating, minimize slagging, and insure adequate mixing of the combustion gases with air, it is necessary to use 10 to 75 per cent excess air. The low value is for gaseous fuels of low heating value burned in large installations that are equipped with complete automatic-control equipment. The highest values are for small hand-fired installations which employ coal as a fuel.

Little danger of overheating of tubes or shells of boilers exists but in the case of pipe stills for heating petroleum oils, larger amounts of excess air are required. The following are normally considered to be satisfactory amounts of excess air for pipe-still heaters:

	Per cent	
	Minimum	Usual
Gaseous fuels	15-20	35
Oil fuels	20-25	50

Little or no data are available on the firing of coal but it would seem to be a situation similar to oil firing.

For large boiler installations, Gaffert (Steam Power Stations, McGraw-Hill Book Co., Inc., New York) suggests the following amounts of excess air:

Coal:	Per cent
Stoker fired	30
Pulverized	20-25
Oil	15
Gaseous fuel	10-15

For the small boilers usually encountered in refineries somewhat larger amounts of excess air would be required but not as large as the 35-50 per cent required when heating oil in pipe stills.

DIGESTS

A.A.P.G. MEETING, LOS ANGELES

THESE are brief highlight digests of some of the important papers delivered at the Pacific Coast regional A.A.P.G. meeting in Los Angeles on November 7 and 8. Other papers dealt with tidal waves from the recent Aleutian earthquake, and with engineering problems involved in dealing with permanent frozen ground.

Petroleum on the Continental Shelves

WALLACE E. PRATT, A.A.P.G., distinguished lecturer, New York City.

PRESIDENT TRUMAN'S executive proclamation of September 25, 1945, declaring the continental shelf contiguous to our coasts to be subject to our jurisdiction and control, fell upon the ears of a petroleum industry which in its world-wide search for new sources of supply had already found its exploratory operations on more than one continent brought to a stop at the land's edge across which it had for years peered uncertainly out to sea. The problem of petroleum resources on the continental shelf challenges first the geologist, then the engineer. The geologist's immediate and pressing responsibility is to review his accumulated knowledge of the character of the continental shelf, and in the light of his concepts of the origin and occurrence of petroleum, to measure the adequacy of the reward which awaits the conquest of petroleum under the submerged margins of the continents to compensate the risk, effort, and expense which this task poses for the engineer. In reply to this challenge to geologists, it is submitted that if the earth is viewed as a functioning organism, surely one of its normal functions since life covered its surface has been the generation of petroleum, much greater volumes of petroleum than are now believed to exist beneath the land areas of the earth should have been formed through the ages. The most likely place to search for these possible additional stores of petroleum is the continental shelf.

Time of Oil and Gas Accumulation

A. I. LEVORSEN, Stanford University.

A PERPLEXING problem in petroleum geology is whether the oil and gas originate at or very near the point of accumulation, or whether they have migrated in from some distant area of origin. Examples of both in situ and distant origin can be cited that seem to indicate both occur in nature.

For those pools which seem to indicate migration from a distant source, a rough guide as to the time of the accumulation is offered. It is based on the timing of the formation of the trap into which the oil and gas accumulate—the accumulation cannot occur before the trap is formed. In considering the interval between the time of formation of the reservoir rock and the present time, most producing traps can be separated into the varying component elements which go to make up the trap as it now exists. Examples of different combinations of trapmaking events are given as a guide to the time before which accumulation could not have occurred. Furthermore, the capacity of a trap is in part a function of the depth of burial of the reservoir—a phenomenon which also supports a relatively late accumulation in many pools.

The Ostracoda in Paleogeography

W. L. ROTHWELL, JR., Richfield Oil Co., Long Beach.

A STUDY of the depth distribution of recent ostracods in the San Pedro Channel from Long Beach to Avalon Bay, Catalina Island, has revealed a new tool to aid in the solution of paleogeographic and ecologic problems in California stratigraphy. These microscopic crustaceans are very abundant in shallow salt-water lagoons, in mainland continental-shelf sediments down to a water depth of 500 ft., and along protected island shores. The samples collected by Alex Clark and Manley L. Natland show by the presence of soft parts that the more abundant species of ostracods were alive on the bottom when dredged.

Comparison with the 26 fossil forms recorded by L. W. LeRoy in 1944 reveals 18 of his species and varieties surviving to Recent time. Total Recent forms recognized to date number approximately 22 genera, 52 species, and 7 subspecies.

Highlights of Washington and Oregon Biostratigraphy

R. STANLEY BECK, consulting paleontologist, Bakersfield.

THE biostratigraphy of type and classical localities of Washington and Oregon are discussed. Special emphasis is given to the Astoria, Cowlitz, Olympic Peninsula, and Coos Bay basins. Strata from Devonian to Recent are known from these areas and have a combined thickness of over 30,000 ft. These basins, as well as others, are possible areas in which oil and gas might be discovered in the future. Favorable as well as unfavorable geologic conditions were discussed concerning oil possibilities of the Pacific Northwest.

Effects of World War 2 on California Oil Reserves

GRAHAM B. MOODY, Standard Oil Co. of California, San Francisco

THE enormous demands of World War II for California oil were met successfully. Production was increased from 230,263,000 bbl. in 1941 to 326,555,000 bbl. in 1945. This is an increase of 41.8 per cent. The comparable figure for the remainder of the United States is 18 per cent. During the period 1941 to 1945, inclusive, California produced 18.2 per cent of total United States oil production and 11.7 per cent of total world production. It increased its proportion of total United States production from 16.4 per cent in 1941 to 19.1 per cent in 1945.

Despite the drain on California's oil resources by World War II, production in the middle of September 1946, was about 870,000 bbl. daily; the daily average during 1941 was about 631,000 bbl. During the period 1941 to 1945, inclusive, the discovery of new pools and new fields in California added estimated reserves equal to about one-third of production during that period. Additional reserves must be discovered in order to continue to meet the unprecedented peacetime demand for California oil. More new pools in present producing areas probably will add larger amounts to reserves than will new fields (Tidelands excepted). It will require intensified geological effort to find these new reserves. There still is ample opportunity in California for the competent and imaginative geologist who can evolve a production program from a mass of factual information.

Stratigraphic and Structural Features of the Ivanpah Quadrangle, Southwestern California

D. F. HEWETT, United States Geological Survey, Washington

THE following conclusions concerning this area of about 3,800 sq. mi. in Southeastern California, are based upon about 25 months' field work between 1921 and 1934. The region records almost uninterrupted sedimentation during Paleozoic and Mesozoic time. Before this, there was a sedimentation (Pahrump Series about 5,000 ft. thick) and this rested upon a crystalline basement (Archean). The Tertiary record of sedimentation and volcanism appears to be wholly late Miocene or early Pliocene. Two major orogenies are recorded by thrust faults and normal faults. The first (Laramide late Cretaceous or early Tertiary) includes at least five major thrust faults along which early Paleozoic rocks generally rest upon upper Paleozoic or early Mesozoic rocks. Great masses of quartz-monzonite were intruded toward the close of the epoch and there was widespread mineralization. It was followed by profound erosion from early Eocene to upper Miocene time. The second orogeny (early Pliocene), followed a period of mid-tertiary sedimentation and volcanism. It is represented by a single great thrust fault, remnants of the upper plate of which have been mapped over an area of 20 by 30 miles. It was followed by normal faults and local sedimentation.

Evidence Supporting Lateral Migration of Oil, San Joaquin Valley, California

GLEN C. FERGUSON, consulting paleontologist, Bakersfield

CONSIDERABLE evidence has been presented from time to time in various geologic publications favoring the accumulation of oil derived from "local rich accumulations of organic matter deposited in restricted areas near to, indigenous to, or in contact with the reservoir and trap." Opposed to this view, other authors have favored substantial migration, either lateral or vertical, or both.

Evidence is presented strongly supporting, if not conclusively proving that oil, when provided the proper avenue for underground movement, does migrate laterally over distances of several miles. Noth-

(Continued on page 96)

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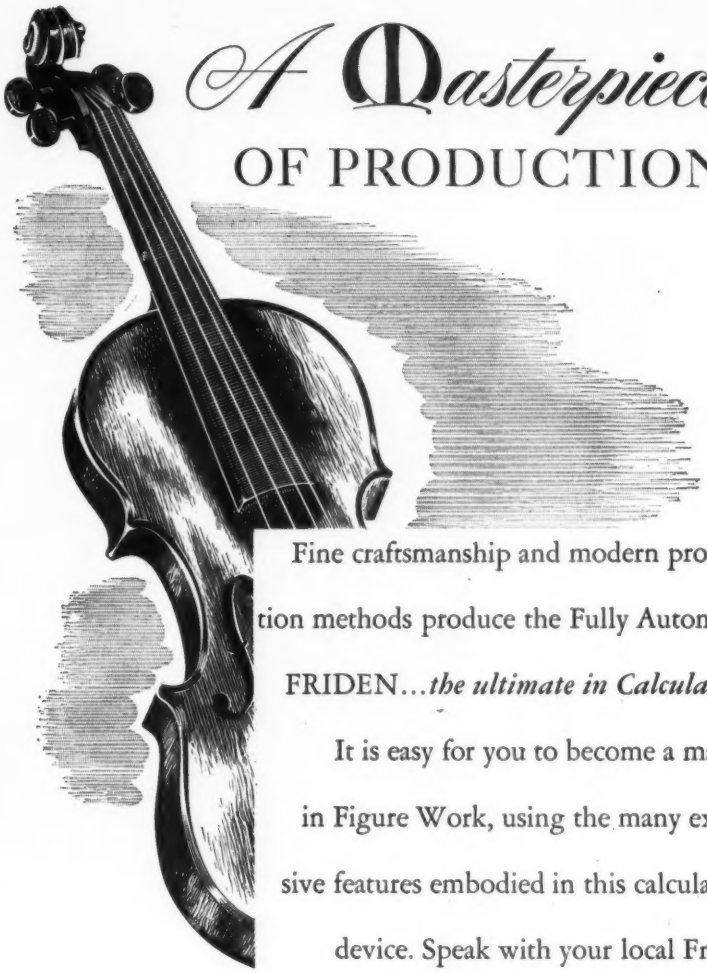

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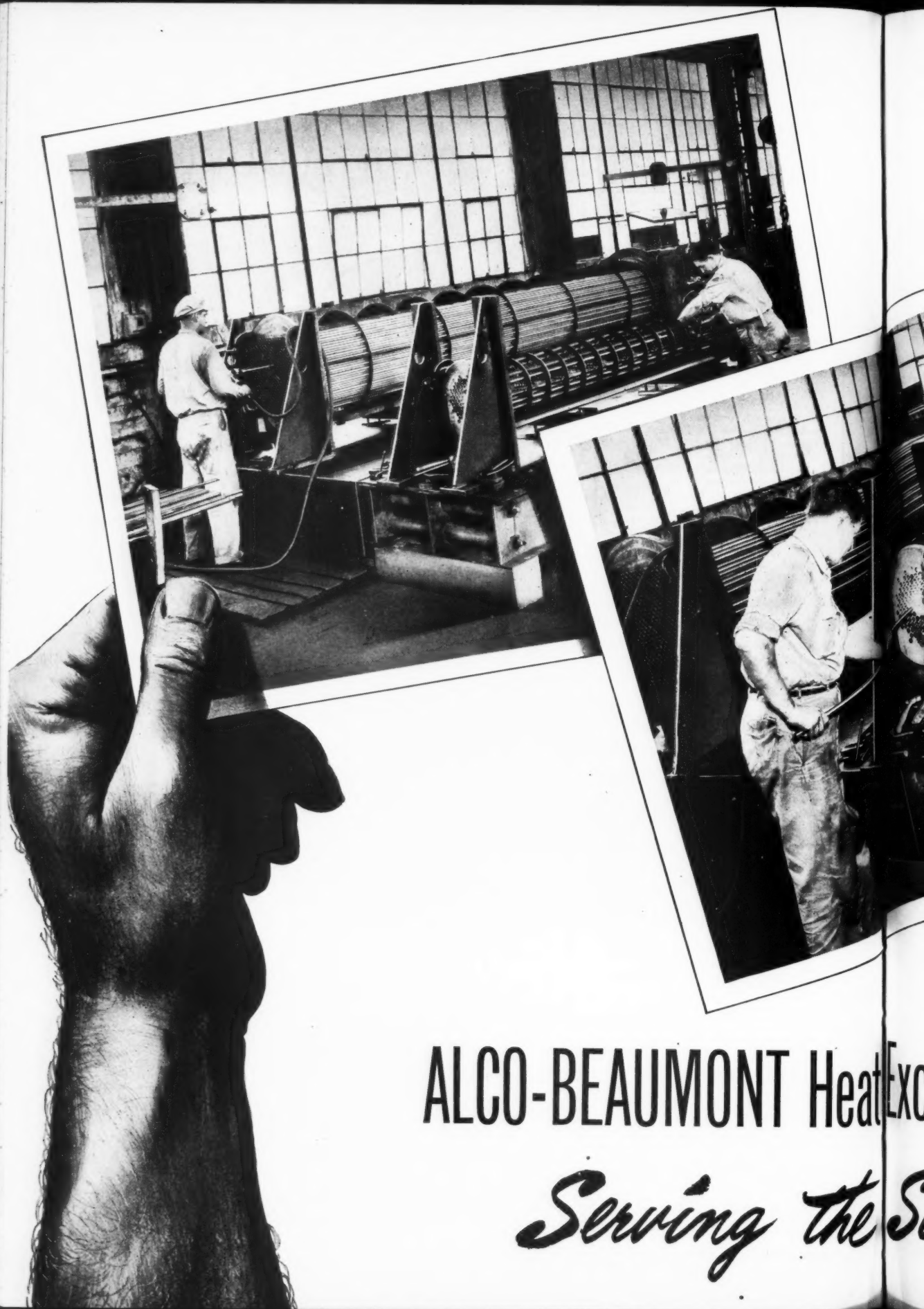

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ing is implied to indicate that oil may not have accumulated locally, having been derived from restricted areas, underground stratigraphic and structural conditions being the governing factors at all times.

Origin and Migration of Oil Into Sespe Red Beds

THOMAS L. BAILEY, Rothschild Oil Co., Santa Fe Springs, Calif.

THE name "Sespe formation," is applied to the nonmarine red bed facies of a group of sedimentary rocks up to 7,500 ft. thick. They range in age from upper Eocene into lower Miocene in the southern and eastern part of the Ventura basin but are probably confined to the Oligocene in most of the northwestern part of that basin. The lower portion becomes progressively marine westward beginning about 25 miles west of Santa Barbara; however, this marine Oligocene is mainly sandstone, low in organic material, and can hardly be a source rock.

The bulk of the evidence suggests that most of the oil was derived from Eocene shales. Upward migration across the bedding of several hundred to a few thousand feet of predominantly sandy strata seems to be required. Countless minor joints and cracks in the shaly interbeds are suggested as the principal channels of upward migration. In the southeastern part of the Ventura basin, some of the oil may have reached the lower, or Eocene portion of the Sespe by lateral migration from upper Eocene shales into which the lower Sespe may grade, followed by upward migration within the anticlines to the shalier middle Sespe where it is trapped.

Notes on the Stratigraphy of the Santa Maria District

ADEN W. HUGHES, Union Oil Co., Santa Maria District

SEVEN oil fields in the Santa Maria district produce oil from four different formations. The most prolific of these is the Monterey shale (middle and upper Miocene). Oil in the Knoxville sandstone, discovered in 1943, created a mild drilling boom, but was limited in areal extent. Lospe production is the latest economic interest in the district. Variation in the age of the Monterey cherty shale in the Santa Maria Valley and other fields makes correlations difficult. Ditch sampling on development as well as wildcat wells has proven a valuable practice in stratigraphic control and aid in electrolog correlations. Microscopic study of washed samples show definite lithologic changes that carry over wide areas.

Ramona Field, Los Angeles and Ventura Counties, California

LOYAL E. NELSON, consulting geologist, Los Angeles

RAMONA field is located 45 miles northwest of Los Angeles near Castaic Junction in the Santa Clara River Basin, Section 18, 4n-17w and Section 13, 4n-18w.

Discovery was effected by The Texas Co. 42-18 Kern, completed April 19, 1945, from 150 ft. of upper Miocene sand at 3,000 ft., flowing 196 bbl. per day 29.3°. A total of 24 wells have been completed since discovery with initial rates ranging from 50 to 150 bbl. per day.

The structure is a northeast trending and plunging anticline with north flank cut by the paralleling Holser thrust fault of 4,000-5,000 ft. throw. Present development has proven an area ¼ mile wide by 1½ miles in length.

Accumulation of Oil in Continental Sediments at the South Belridge Oil Field, Kern County, California

E. J. COENEN and H. D. HOBSON, General Petroleum Corp., Bakersfield

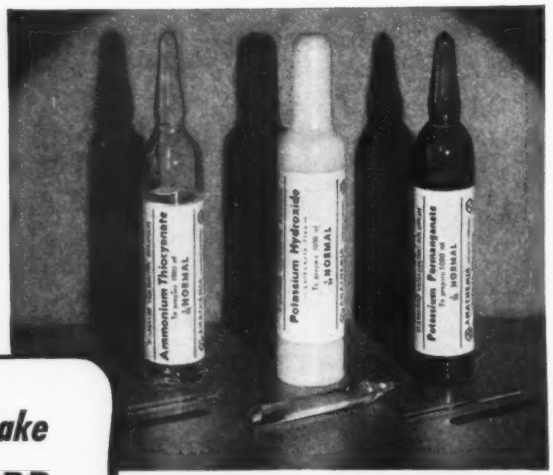
FACTUAL data are presented concerning the accumulation of oil in continental sediments at the South Belridge oil field. Included are the structure and stratigraphy of the field, the reservoir characteristics of the sediment, and the properties and distribution of the oil and associated waters. The lithology, organic content, and included fluids of adjacent marine sediments are discussed with the objective of making tentative suggestions as to the origin, migration and accumulation of the oil.

Geology of Basement Complex Edison Oil Field, Kern County, California

J. H. BEACH, Independent Exploration Co., and HARRY CAMPBELL, Jergins Oil Co., Bakersfield

THE pre-Tertiary metamorphics in the Edison oil field have, since the discovery of this zone by H. H. Magee in June 1945, yielded 3,300,000 bbl. of oil to August 31, 1946. Of the 103 wells which have since been drilled into the basement during its development, all but 6 have been completed as commercial producers.

Oil has accumulated within the metamorphics in approximately the same area that contains oil in the overlying sediments. The oil produced from the basement is similar to that of the oil produced



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Santiago Pool, Kern County, California

GLENN W. LEDINGHAM, Western Gulf Oil Co., Bakersfield

THE Santiago Pool is located in Sections 21 and 22, 11n-23w in the south San Joaquin Valley. The initial completion was on August 1, 1945, and since that time 26 producers and 4 dry holes have been drilled.

Production was established from an upper Miocene sand roughly equivalent in age to the basal part of the Stevens sand. The average dip is 70°. The developed portion of the pool is 1¾ miles long with a maximum width of 500 ft. The north, south, and west limits have been established and development is continuing easterly.

The Glendora Volcanics

JOHN S. SHELTON, Pomona College, Claremont, Calif.

THE term Glendora Volcanics has been given to the series of volcanic rocks exposed in the northeastern San Gabriel basin, Los Angeles County, California. They consist of flows, tuff breccias, and tuffs ranging in composition from olivine basalt to glassy rhyolite or dacite, the most abundant being andesitic flows and pyroclastics. Thicknesses reach at least 2,000 ft. in exposed sections and about 3,500 ft. in wells. Luisian foraminifera and fish scales from sediments interbedded with upper members of the volcanics indicate that they are probably largely of upper middle Miocene age.

Conversion of Natural Gas to Liquid Fuels

(Continued from page 82)

ations without the necessity for compression. This leaves only the oxygen which must be compressed as it comes from the low-temperature unit at approximately atmospheric pressure.

Discussion of Catalysts

Although there is still room for improvements and possibilities in fixed-bed operation, for the synthesis of hydrocarbons from water gas, fluid-type catalytic operation has special significance. In the first place, the finely divided catalyst presents a greater amount of easily accessible surface. Thus the reaction proceeds faster. For example, in the standard German type of operation with granular or pelleted catalyst the space velocities in volumes of fresh feed per volume of catalyst per hour vary from about 100 to 250 whereas in fluid-type operation with iron catalysts space velocities between 2,000 and 3,000 may be used.

Secondly, the use of fluid catalysts simplifies the problem of heat removal. We have mentioned previously the very high heat of reaction which attends the formation of hydrocarbons from water gas. The average reaction heat amounts to about 7,000 B.t.u. per pound of product formed. In fluid operation not only is the allowable reaction rate 10-20-fold greater than in fixed-bed operation, but much greater distances of separation of catalyst from cooling surfaces may be used. The constant and violent motion of catalyst and gases maintains a uniform temperature within the reaction even at a large temperature differential between the cooling surface and catalyst.

Having described briefly the major improvements which American research has contributed to the original Fischer-Tropsch process, it might be well to piece them together into a simplified flow-diagram in order to illustrate how the process may work on a commercial scale. Looking at the diagram in Fig. 2, desulfurized natural gas and oxygen are preheated separately and passed into a combustion reactor where synthesis gas consisting of two parts of hydrogen to one part of carbon monoxide is produced. The exit gas is cooled from about 2,100° F. down to 600° F. in a waste-heat boiler where a portion of

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the power requirements of the plant as steam is produced. The gas at about 600° F. is now passed into the synthesis reactor where liquid hydrocarbon product is formed. Here the reaction occurs in the presence of powdered iron catalyst in a fluidized state. The reaction temperature is controlled by water-cooled tubes extending into the reactor. Tremendous quantities of steam are thus produced for use as power throughout the plant. The plant as a whole is practically self-sufficient in power.

By mild refining such as treatment at relatively low temperature over bauxite the raw gasoline will show about 75-80 octane number. The cetane number of the diesel fuel is more than 50.

From 60 million cubic feet of natural gas the yield is estimated to be approximately 5,000 bbl. of total refined hydrocarbon product consisting of about 4,100 bbl. of motor fuel and 900 bbl. of diesel fuel. These are average figures based on various reports in the literature. In addition, about 360 bbl. of oxygenated products are produced chiefly grain alcohol.

There is no better way to show the significance of the American improvements than to give the estimated investment and production costs of the American and European processes. In Table 2 these comparisons are given.

TABLE 2—COMPARATIVE COST FOR PRODUCTION OF LIQUID FUELS: EUROPEAN AND AMERICAN PROCESSES

	Investment cost (bbl. per day)	Cost per gal. including 10% depreciation (cents)
European process using coal	$7,600	*19.2
European process using natural gas	$4,750	†8.8
American process using natural gas	$2,000-$2,500	Approx. †5.0

*Coal at $2.75 per ton. †Natural gas at 5 cents per M.c.f.

As for the future of plants for conversion of natural gas to liquid fuels, there is every reason to believe that within the next 5 years several commercial units will be in operation. Being a new process, many unanticipated difficulties will be encountered during the initial months of operation of these plants, but none of these difficulties is expected to be insurmountable. One can also expect further improvements in the use of coal in this process, so that in the next 10 years or so it may become competitive too.

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Oil Industry Becomes Major Bentonite Market

WASHINGTON.—Sales of bentonite to the petroleum industry in 1945 for use in drilling muds increased 34 per cent over 1944 and more than made up for the loss of bentonite sales to the foundry industry resulting from reduced peacetime foundry activity, according to a report of the U. S. Bureau of Mines.

Bentonite sold or used by producers in the United States in 1945 was listed at 573,998 short tons with a value $3,770,625. Of this total, 28 per cent was used for drilling mud and about the same percentage for foundries. Slightly more than 25 per cent was used for oil filtering and decolorizing. Total bentonite sold or used

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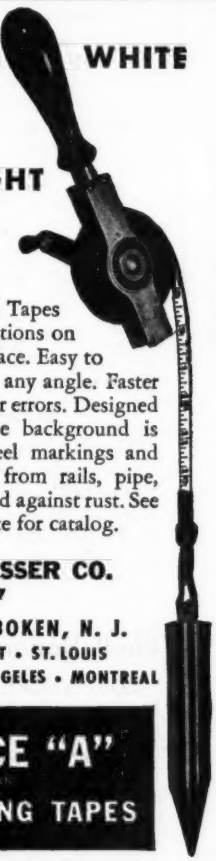

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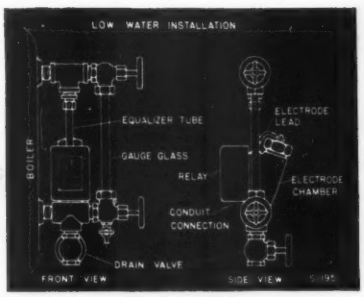

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by producers in 1945 exceeded the 1944 tonnage by 5 per cent and tripled that of 1938, the bureau report said.

New Corrosion Inhibitor Demonstrated in Tests

(Continued from page 87)

and the coupon corrosion rate of each well will be tested at regular intervals.

The 1 Robinson well is equipped with a tubing packer, with a perforated joint of tubing just above the packer, so that inhibitor injected into the casing annulus is forced into the tubing-gas-flow stream, thus preventing any loss of inhibitor to the formation. The amount of inhibitor required to protect a well completed in this manner will be carefully observed to compare with the amount of inhibitor required by a similar well not equipped with a packer.

The iron content of the water separated at the plant gas inlet separator will be checked regularly to determine whether the inhibitor injected in the well will also protect the well flow lines from corrosion.

Conclusions

1. These field tests indicate that the inhibitor Kontol 115 reduced the corrosion rate in the 1 Harris well to 7 per cent of the original coupon corrosion rate, with the injection of 1.75 qt. of inhibitor into annulus of the well while the tubing was producing at a rate of 4 million cubic feet gas per day.

2. The cost of the inhibitor during this test was $0.87 per day or $0.21 per million cubic feet of gas.

3. The inhibitor exhibits a residual corrosion reduction effect for several days after the injection of chemical is discontinued.

4. No evidence was observed to indicate any plugging of the formation of the well tubing.

5. No emulsion troubles have been observed in the cycling plant processing the condensate from this well.

TABLE 3—METHOD OF IRON ANALYSIS

To 25 ml. of sample add 5 ml. 3N.HCl and 5 ml. saturated potassium persulfate. Warm nearly to boiling, cool and transfer to 50-ml. Nessler tube. Rinse container with 5 ml. distilled water which is then poured into the Nessler tube. Add 5 ml. of 5 per cent potassium thiocyanate solution and dilute to the mark with distilled water. Estimate iron content by comparison with similar tubes containing standard iron comparison solutions.

If iron content is too high to read on standard tubes, use smaller amount of water sample, and correct readings accordingly.

Convenient color comparison solutions, used in this work, given below:

Platinum solution.—Dissolve 4 g. K_2PtCl_6 in distilled water, add 200 ml. of 12 M HCl, then dilute to 1 l. with distilled water to 1 l.

Cobalt solution.—Dissolve 48 g. of $CoCl_2 \cdot 6H_2O$ in distilled water, add 200 ml. of 12 M HCl, then dilute with distilled water to 1 l.

Standard No.	25/50 p.p.m.	Ml. of platinum sol.	Ml. of cobalt sol.
1	.2	1.00	0.60
2	.4	2.25	1.20
3	.6	3.30	1.85
4	.8	4.65	2.75
5	1.0	5.75	3.65
6	1.5	8.85	6.60
7	2.0	11.30	10.00
8	2.5	14.70	12.80
9	3.0	16.85	15.10

Dilute each to 50 ml. with distilled water.

Acknowledgments

The field work was carried out in cooperation with the personnel of Tretolite Co., and special acknowledgment is made to Howard Andrews, R. F. Scivially, and Dr. C. M. Blair for assistance in carrying on the inhibitor test program.

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LOS ANGELES. — Shell Oil Co., Inc., has just completed a series of nine banquets in the Southern California area honoring employes with 10 or more years of service. A total of 2,335 Shell employes attended, according to S. F. Bowlby, vice president, Los Angeles management.

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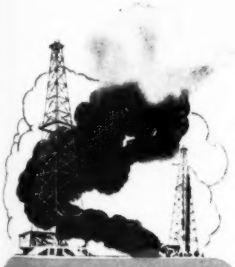

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You men in the oil industry know him well. In fact men in all industries know him, for when he has something to say, men in industrial and government affairs pay attention.

You knew him and we knew him when he was on his way up. He worked long hours. He took chances in that most individualistic of all industries—oil. He knew discouragement as all men who lead must know. But more often he knew the thrill and joy of bringing in wells in proved, semi-proved, and wildcat areas.

We manufacturers are indebted to him. It is his kind that has made the oil industry great. He epitomizes all leaders and entrepreneurs in the great oil industry. He represents that great group of virile wealth-creating oil men whose efforts have not only made jobs for thousands of executives, engineers, superintendents, drillers, and roughnecks, but have in addition made jobs for men working in hundreds of plants manufacturing oil field tools and equipment. That this typical oil man who has reached the top regards his wealth as a sacred trust is made manifest by his charity, his philanthropy, and his interest in his city, his state and his nation. We hail the oil man who has won out in this industry where only men of great resourcefulness and determination succeed. There are many such and there are many on the way. We work closely with them to make better rotary drilling tools.

Reed
ROLLER BIT COMPANY

Working with the men in the field...

HAS ENABLED REED TO MANUFACTURE ADVANCED AND PRACTICAL ROTARY DRILLING TOOLS

REED ROCK BITS

give you faster, straighter full gauge hole with Less Weight

Because of the use of the Reed cross-roller principle, the Reed Rock Bit gets the hole down without depending on crushing action that requires heavy weights. This Reed principle gives a strong braced support which forces the cutters to take a path against their natural tendency to track. This causes the cutters to twist and tear the formation as they penetrate . . . making for faster digging with less weight.

REED *HAND-APPLIED* *Super Shrink-Grip* TOOL JOINTS

give you GREATER ECONOMY

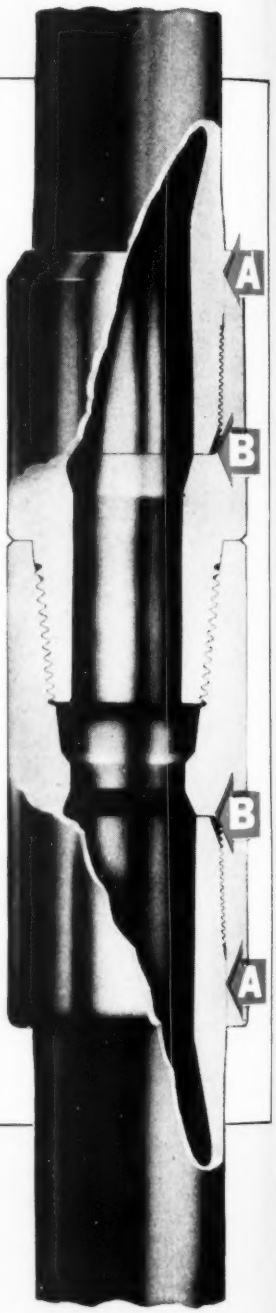
because they can be applied or replaced BY HAND in the field . . . reducing your transportation costs, application costs and shut down time.

. . . They give you **GREATER PROTECTION** against leakage and failure because of the DOUBLE SEAL, (A) and (B).

A — **The Shrink-Grip "SAFETY AREA"** is an extended tool joint counter-bore shrunk onto a machined external upset on the drill pipe.

B — **The GAUGING SHOULDER** upon which the end of the drill pipe lands, assures proper makeup and affords an added seal against leakage.

NO GAUGING OR SELECTIVE FITTING IS REQUIRED



Only **REED PIONEERING, REED RESEARCH AND REED MANUFACTURING EXPERIENCE CAN GIVE YOU REED RELIABILITY AND REED EFFICIENCY IN ROTARY DRILLING TOOLS**

Reed ROLLER BIT COMPANY

HOUSTON 1, TEXAS, U. S. A.

EXPORT OFFICE • 1836 R. C. A. BUILDING • NEW YORK 20, NEW YORK, U. S. A

The Refiner's Notebook

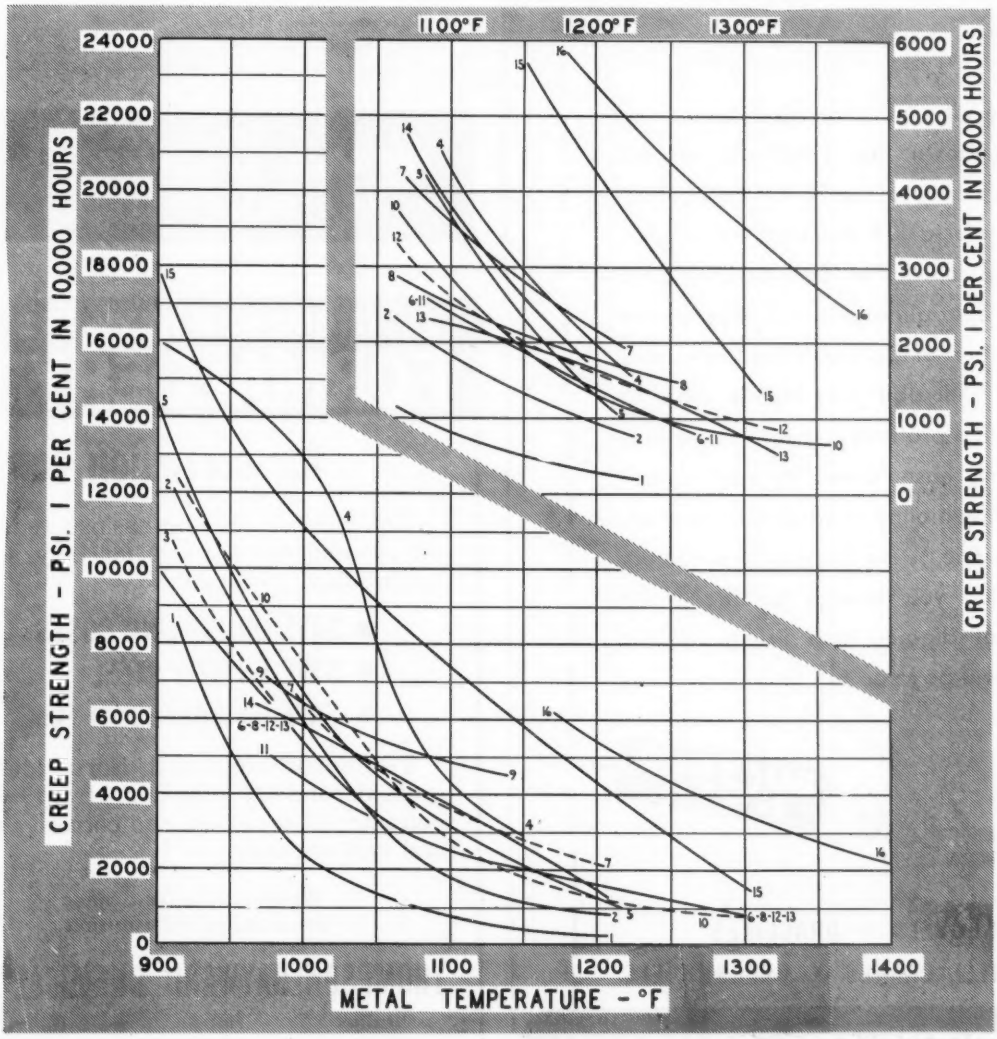
A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Creep Strength of Steels

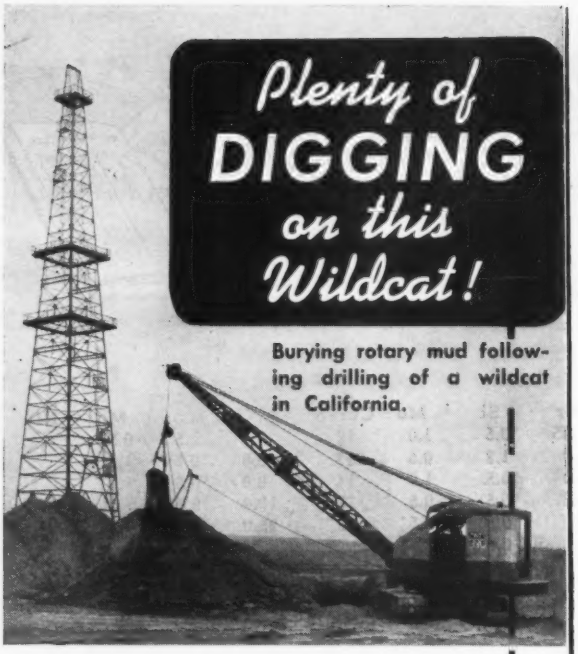
1 Per Cent in 100,000 Hours

Curve	% Cr	% Si	% Mo	Curve	% Cr	% Si	% Mo	Curve	% Cr	% Si	% Mo	% Ni
1	...	0.25	...	7	2.25	*0.5	1.0	12	5.0	1.5	0.5	...
2	...	*0.25	0.5	8	3.0	1.2	0.5	13	5.0	*0.75	1.0	...
3	...	*0.25	1.0	9	3.0	*0.5	1.0	14	9.0	*0.5	1.1	...
4	1.2	0.75	0.5	10	5.0	*0.5	0.5	15	18.0	*0.75	...	8.0
5	2.0	*0.5	0.5	11	5.0	*0.5	0.5	16	25.0	*0.75	...	20.0
6	2.0	1.2	0.5			and 0.5 Al.						

*Maximum.



No. 118 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa



Plenty of DIGGING on this Wildcat!

Burying rotary mud following drilling of a wildcat in California.

Like all oil-field drilling operations, putting down this California wildcat meant plenty of earth to move, fast. No wonder a fast machine was chosen for the job. The Bucyrus-Erie 22-B ¾-yard dragline pictured here is one of number of Bucyrus-Eries that have proved their ability to handle oil field excavating profitably. Featuring speed, operating ease, durability and in-the-field convertibility to various front-ends, Bucyrus-Erie ⅜- to 2½-yard excavators can bring you savings on the entire range of digging and lifting. That's why it will pay you to

87E46

check BUCYRUS ERIE

SHOVELS • DRAGLINES
CLAMSHELL-CRANES • DRAGSHOVELS

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

BETTER ALLOYS = Better Valve Checks

THE REASON FOR NO-CO-RO SUPREMACY

• For nearly half a century Norris Brothers, Inc., have specialized in the development of better steels as the *first* requirement of more efficient, longer-lasting valve checks. The resultant alloy—NO-CO-RO—is a truly remarkable metallurgical achievement. It resists the action of salt and acid. It will not pit, chip, or corrode—and it is available *only* in NO-CO-RO Balls and Seats and NO-CO-RO Drops and Seats.

Norris Brothers, INC.
ROBINSON · ILLINOIS

THOMPSON-HAYWARD
FORMALDEHYDE
for corrosion control

You can protect your casings, rods, and all exposed metal parts for only a few cents a day. You can

- SAVE ON PULLING COSTS
- SAVE ON NEW STEEL
- SAVE ON SHUTDOWN TIME

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(B)

A FEATURE OF THE OIL AND GAS JOURNAL

Lime-Soda Water Softening

LIME-SODA softening is the process by which the calcium and magnesium salts constituting the hardness content of a water are chemically precipitated and removed through the use of lime (calcium hydroxide) and soda ash (sodium carbonate). This process may be carried out at normal raw-water temperatures, in which case it is referred to as "cold process" or at temperatures near or above the boiling point, referred to as "hot process."

The lime-soda ash process is based upon four essential factors:

1. Proper selection of specific reagents to efficiently precipitate part of the impurities to be removed in the form of an insoluble sludge and to convert the remainder to a soluble form.
2. Correct proportioning of the specific chemical reagents to the raw water.
3. Propagating the chemical precipitating reactions by a suitable combination of coagulation, sedimentation, heat, or sludge contact.
4. Filtration of the chemically softened or finished water to remove traces of turbidity or suspended matter resulting from the process.

Use or Purpose

Lime-soda softening is employed for the removal of hardness in order to prevent scale and sludge in boilers, reduce calcium carbonate deposition in heat exchange systems and cooling water systems, and in general to remove hardness wherever hardness in water is a source of difficulty either in industrial process water, boiler feed water or municipal supply.

Incidental to the removal of hardness in the proper operation of lime-soda softening, iron, free carbon dioxide and turbidity are removed.

Chemistry Involved

Hydrated lime—$Ca(OH)_2$—of 90 per cent purity is usually employed in hot-process lime-soda softening, or in cold-process softening where the quantity of water softened is not exceptionally large. In cold-process systems where very large quantities of water are softened, such as a municipal plant, it is usually more economical to employ unslaked lime—CaO—which is first slaked to form hydrated lime at the plant in accordance with the following reaction:

$$\underset{\text{unslaked lime (calcium oxide)}}{CaO} + \underset{\text{water}}{H_2O} \quad (1)$$

$$= \underset{\text{hydrated lime (calcium hydroxide)}}{Ca(OH)_2}$$

Soda ash—Na_2CO_3—of 98 per cent purity is employed in lime-soda softening at the usual specification of 58 per cent Na_2O content.

Use of lime and soda ash.—Hydrated lime reacts to chemically precipitate the carbonate hardness present in water, thereby producing insoluble precipitates of calcium carbonate—$CaCO_3$—and magnesium hydroxide—$Mg(OH)_2$—without the production of any soluble byproducts. These suspended precipitates are removed by sedimentation and filtration and thus a marked reduction in solids content is obtained.

The carbonate hardness of a water is composed of the carbonates and bicarbonates of calcium and magnesium. Their precipitation by means of hydrated lime proceeds in accordance with the following reactions:

$$\underset{\text{calcium bicarbonate}}{Ca(HCO_3)_2} + \underset{\text{calcium hydroxide}}{Ca(OH)_2} \quad (2)$$

$$= \underset{\text{calcium carbonate}}{2CaCO_3} + \underset{\text{water}}{2H_2O}$$

$$\underset{\text{magnesium bicarbonate}}{Mg(HCO_3)_2} + \underset{\text{calcium hydroxide}}{2Ca(OH)_2} \quad (3)$$

$$= \underset{\text{magnesium hydroxide}}{Mg(OH)_2} + \underset{\text{calcium carbonate}}{2CaCO_3} + \underset{\text{water}}{2H_2O}$$

Hydrated lime also reacts with the magnesium salts constituting a portion of the noncarbonate hardness of water. In these reactions, insoluble magnesium hydroxide is produced. This precipitate is removed in the softening process by sedimentation and filtration. However, a soluble byproduct of calcium sulfate, calcium chloride, etc., is formed as illustrated below:

$$\underset{\text{magnesium sulfate}}{MgSO_4} + \underset{\text{calcium hydroxide}}{Ca(OH)_2} \quad (4)$$

$$= \underset{\text{magnesium hydroxide}}{Mg(OH)_2} + \underset{\text{calcium sulfate}}{CaSO_4}$$

$$\underset{\text{magnesium chloride}}{MgCl_2} + \underset{\text{calcium hydroxide}}{Ca(OH)_2} \quad (5)$$

$$= \underset{\text{magnesium hydroxide}}{Mg(OH)_2} + \underset{\text{calcium chloride}}{CaCl_2}$$

Such soluble byproducts of calcium sulfate, calcium chloride, etc., must be removed in the softening process, since these salts, together with the calcium sulfate and the calcium chloride naturally present in a water, constitute the calcium non-carbonate hardness.

Calcium sulfate, calcium chloride, etc., whether produced as byproducts in the above reactions or naturally present in a water, are chemically precipitated as calcium carbonate—$CaCO_3$—by the use of soda ash (sodium carbonate) as follows:

$$\underset{\text{calcium sulfate}}{CaSO_4} + \underset{\text{sodium carbonate}}{Na_2CO_3} \quad (6)$$

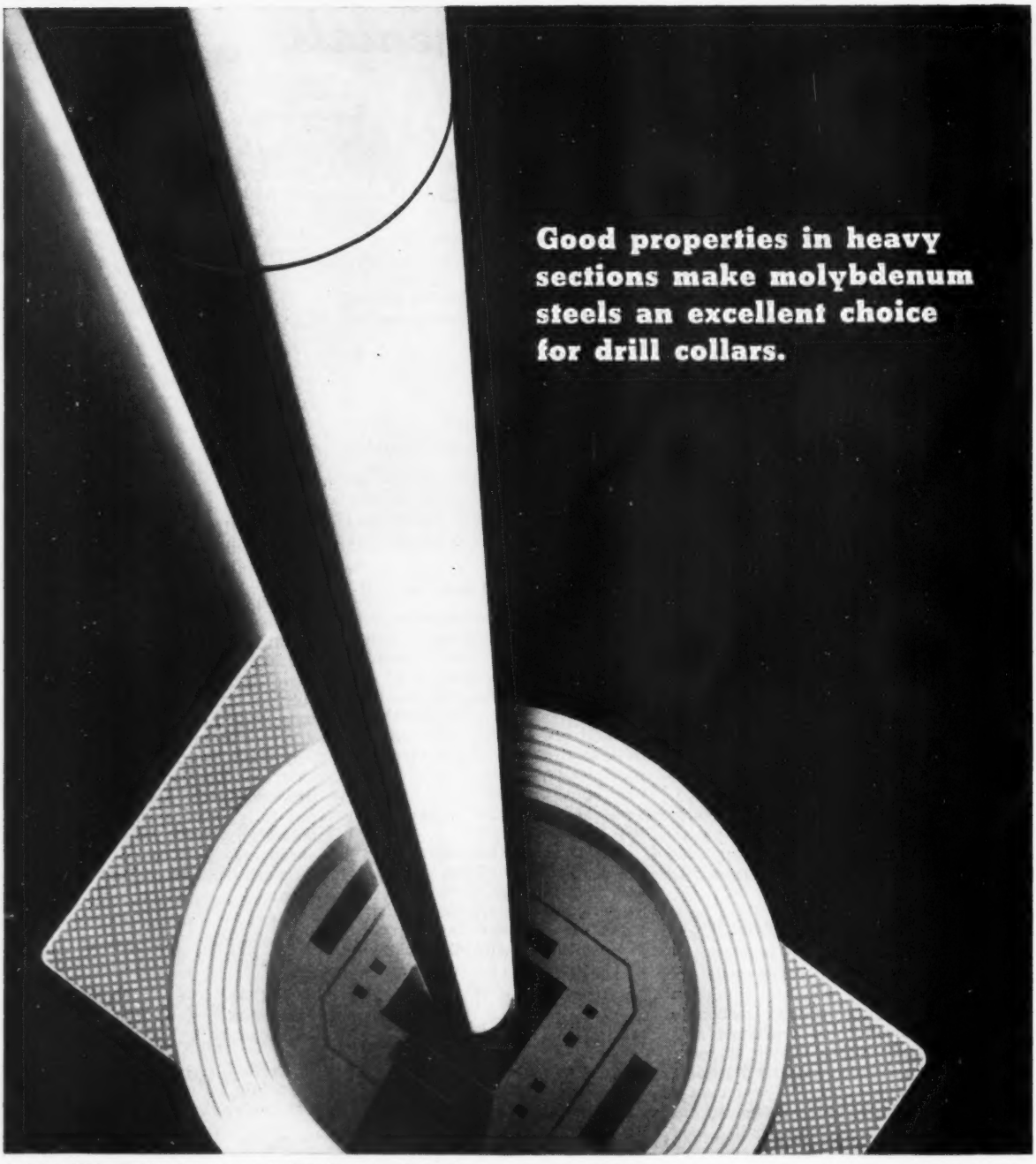
$$= \underset{\text{calcium carbonate}}{CaCO_3} + \underset{\text{sodium sulfate}}{Na_2SO_4}$$

$$\underset{\text{calcium chloride}}{CaCl_2} + \underset{\text{sodium carbonate}}{Na_2CO_3} \quad (7)$$

$$= \underset{\text{calcium carbonate}}{CaCO_3} + \underset{\text{sodium chloride}}{2NaCl}$$

In the above reaction while the calcium content is precipitated as insoluble calcium carbonate, soluble byproducts in the form of sodium sulfate and sodium chloride are produced. While the use of soda ash in lime-soda softening effects removal of the hardness, a decrease in solids content is not obtained because of the production of soluble sodium salts. The previously given reactions with lime, however, do result in a reduction of the solids content.

This material is from the Betz Handbook for Industrial Water Conditioning, written and published by W. H. and L. D. Betz, consulting engineers, Philadelphia.



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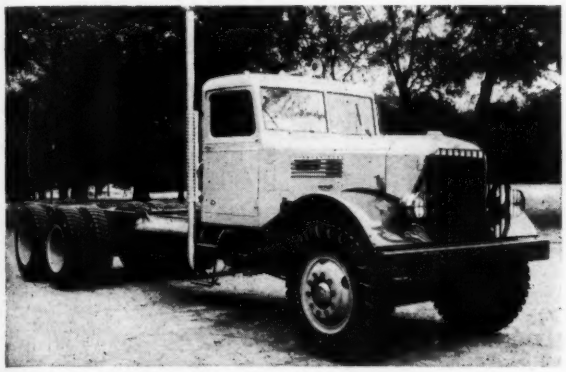
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by John M. Spears

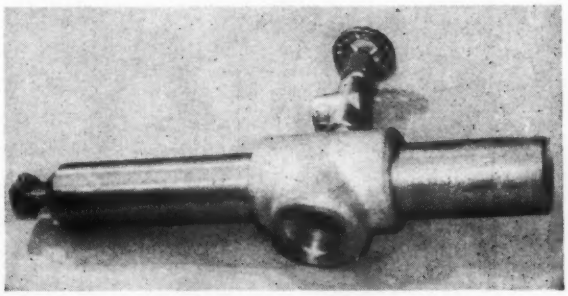
(1) NEW HEAVY-DUTY TRUCKS of six gross vehicle weights from 28,500 to 90,000 lb. are produced in highway and off-highway designs. Standard equipment is with International-Continental engines; all six of the models are available with Cummins diesels or Hall-Scott gasoline engines. Optional equipment includes a



selection of six Spicer and two Fuller heavy-duty transmissions of 4, 5, and 10-speed types, and also 3-speed Spicer auxiliary transmissions of either the direct or over-drive type. Pictured is 65,000-lb. model with tandem driving axle. Standard equipment includes front and rear air brakes, semielliptic springs with full-floating rear-spring suspension, steering gear of roller-bearing and cam-and-twin lever, and disk-type wheels. Cab is rubber cushioned against noise, vibration, and distortion. All controls are easy to reach. *International Harvester Co.*

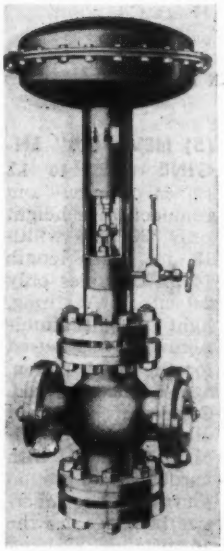
IT'S NEW CHECK IT

(2) NEW SAFETY VALVE for the oil industry is actuated by the velocity of line fluids on its cone-shaped valve stem. Provides a surface-installed, simple, and inexpensive means of shutting in wells, flow lines, or pipe lines in the event a break occurs in the flow system. Valve is actuated by the "drag" of fluids—gas or oil—on its cone-shaped valve stem. The valve is set, by means of one screw adjustment, to pass fluids at a certain desired velocity. If the pressure drop across the valve increases, as would happen in event of a line



break downstream from the valve, the increase in rate of flow or increased velocity past the cone valve stem will pull the stem into the seat, thereby shutting in the well. Reopening the valve must be done manually to insure that flow will not start again until desired. *Oilfield Machine & Supply Co.*

IT'S NEW CHECK IT



(3) DIAPHRAGM CONTROL VALVES feature a single body casting and split-flange construction, giving a Van Stone type of joint for A.S.A. pressure ratings of 150, 300, and 600 lb. Advantage of split-flange construction is that valves may be changed from point to point for use at different pressure ratings by replacing the removable flanges. Available in sizes ½ to 1-in. alloy construction of 304 or 316 stainless steel, or other corrosion-resistant alloys in cast form. Standard air-pressure operating range is 2-15 psi. *Hammel-Dahl Co.*

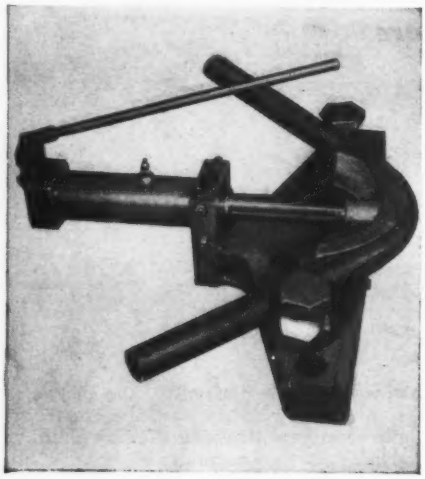
IT'S NEW CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

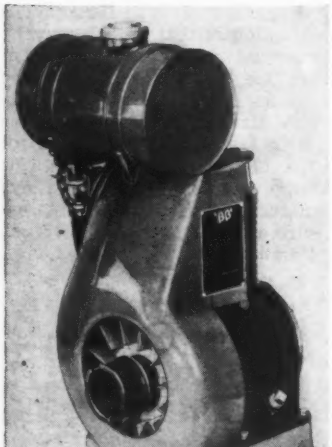
OIL AND GAS EQUIPMENT *Digest* — IT'S NEW ✓ CHECK IT

(4) PORTABLE PIPE BENDER of the open-jaw hydraulic type simplifies "on the spot" pipe-bending problems. For cold bending, accurate die settings and easy action of ram reduce effort while assuring desired bends of any



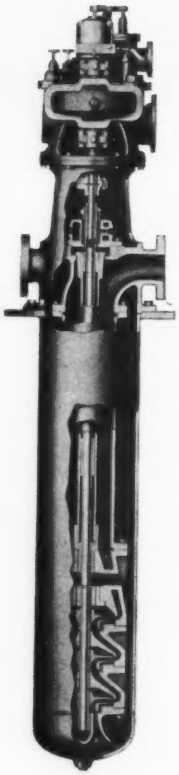
standard angle. A scale is available which, when set at desired angle of bend, makes it unnecessary to measure bend at each operation. Its open-jaw construction permits the pipe readily to be placed into and removed from the bender without having to remove any of the bending dies or formers. *Watson-Stillman Co.*

IT'S NEW ✓ CHECK IT



(5) NEW "BB" ENGINE of 2.5 to 4.3 hp. is clean-cut and compact with height only 33 in., width 15 in., and length 14 in. Occupies only 2.9 cu. ft. A strong, light-weight aluminum alloy is used for the head, piston, and connecting rod. Crankshaft is forged alloy steel, dynamically balanced, with hardened and ground journals. The oversize bearings are the antifriction roller type. There are hardened steel valve seats in both intake and exhaust valve ports. A single casting of Meehanite alloy forms crankcase and block. Power takeoff shaft is of 1-in. diameter. *Gladden Products Corp.*

IT'S NEW ✓ CHECK IT

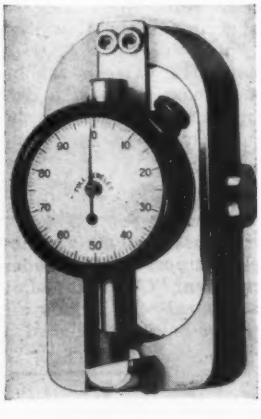


(6) CENTRIFUGAL PUMPS for use in petroleum refining, chemical, and many process applications, embody three principal types: Boiler feed, single-stage horizontal, and vertical. Vertical pump illustrated is built in single-stage or multistage to fit the head conditions. The circular stationary and rotating parts of the pumping element are suspended in the outer case and permit free and uniform expansion and contraction without leakage from temperature changes. all rotating parts are balanced dynamically and radially to eliminate destruction effects of vibration or shaft whip on the guide bushings and packing. Simple and accessible, built for continuous operation over long periods. *Pacific Pumps, Inc.*

IT'S NEW ✓ CHECK IT

(7) UNITIZED TUBING BLOCK AND HOOK is compact and streamlined. Has a rated capacity of 45 tons and is available with one or two 24-in.-diameter sheaves. Quick-opening design permits lines to be reeved without disconnecting the hook, which may either swivel or be locked in any one of eight positions. Load is carried in balance avoiding off-center strains. The hook link carries proportional part of load, eliminating flexing and fatiguing of the hook under repeated heavy loads. Streamlined body has no protruding bolts or sections to hang up or cause injuries. *The Guiberson Corp.*

IT'S NEW ✓ CHECK IT

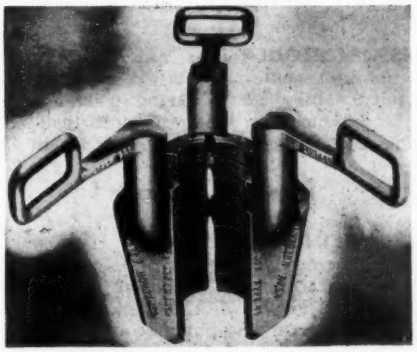


(8) MECHANICAL PRESSURE GAGE for either static or moving loads. A jeweled dial indicator is mounted to a V-shaped pressure bar so when load is appled to the bar on anvils at its center, the indicator measures exact amount of deformation, translating it directly into pounds pressure. For example, it is often necessary to know the amount of outward thrust on a moving member, or to cause it to revolve under a certain pressure. Through mechani-

cal adaptation, gage itself can be easily converted into a variety of testing devices. Can be used inside vises and air clamps. Indicates pressure between platens in all types of presses, pressure between moving rollers, and tension in a moving wire, etc. *W. C. Dillon & Co., Inc.*

IT'S NEW CHECK IT

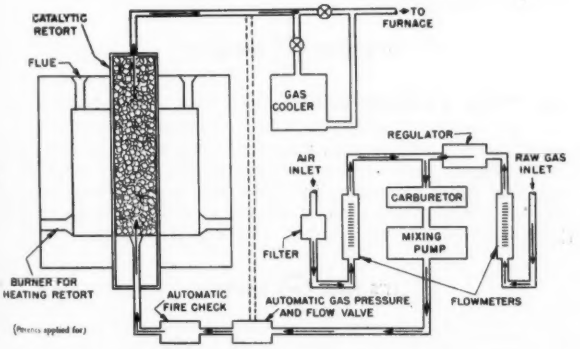
(9) NEW UNIT SLIPS safely support long strings of drill pipe. Four individual segments provide flexibility and even distribution of pipe weight. Each segment aligns independently around pipe and carries its pro-



portionate amount of weight. Nine separate, broad-faced inserts in each segment provide for inconformities in pipe walls and insure true contact. Ample fluid drain back is provided. New handle design keeps the operator's hands clear of the rotary table and elevators at all times and provides balance for easy setting and picking up of the slips. Through interchangeable segment inserts, several sizes of pipe can be handled with one set of slips. Inserts are easily removed and replaced on the derrick floor. *Kinzbach Tool Co., Inc.*

IT'S NEW CHECK IT

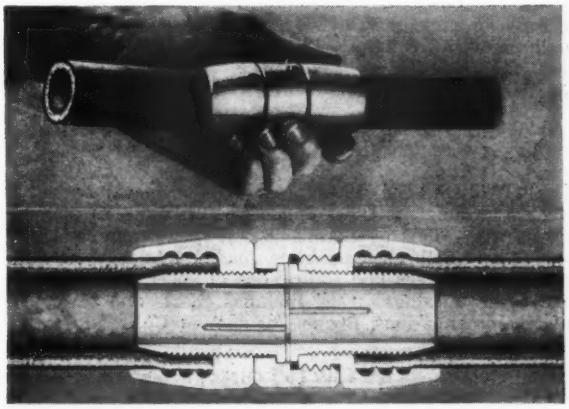
(10) HYDRYZING GENERATOR is an automatic central station endothermic atmosphere generator that can furnish atmosphere for a number of furnaces. This new unit produces clean, dry gas for hardening, brazing, and sintering all medium and high-carbon steels without



carburization. Gas analysis is carbon dioxide 0.0 per cent, carbon monoxide 21.0 per cent, hydrogen 40.0 per cent, methane 1.0 per cent, nitrogen 38.0 per cent, oxygen 0.0 per cent; dew point —20° F. Fully automatic. Operates by natural gas or propane-butane for both atmosphere and heating. Units are compactly constructed and require a minimum of floor area. *Lindberg Engineering Co.*

IT'S NEW CHECK IT

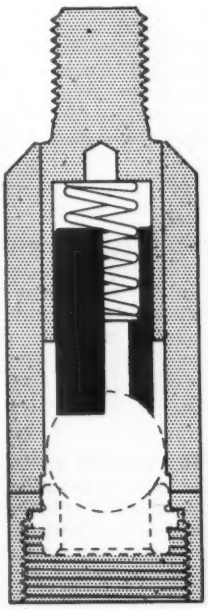
OIL AND GAS EQUIPMENT Digest — IT'S NEW CHECK IT



(11) STREAMLINE HOSE COUPLING for high pressures is now available to oil industry. Used in chemical, spray, and fire hose, etc., where pressures exceeding 1,000 lb. psi. are employed. Maintains full diameter of hose at coupling, assuring uninterrupted flow. Streamlining of coupling and compact design keeps weight and size to minimum. Diagram shows method of locking hose into position between outer shell walls and internal expander units. *Bar-Way Manufacturing Co.*

IT'S NEW CHECK IT

(12) SNUBBER CAGE for oil-well pumps in all sizes, and to A.P.I. specifications, has a brass follower, actuated by monel metal spring, to ride the ball continually. Advantages reported: (1) Preventing the ball from beating out the wings of the cage; (2) eliminates gas locks; (3) helps eliminate lodestone trouble; (4) picks up barrelage by seating the ball more quickly. *Baird Manufacturing Co.*



IT'S NEW CHECK IT

TRADE LITERATURE

(13) SCREW THREAD manual gives practical information for use in precision thread grinding. Complete compilation of selected thread systems, forms, and measurements. Contains descriptions, tolerances, and information on measuring threads with the three wire system. Useful tables and charts for many standard thread forms include the Whitworth and British association. *Ex-Cell-O Corp.*

IT'S NEW CHECK IT

(14) HOODS AND HELMETS. Guide selects proper hoods and helmets for refining and field operations. Aids in elimination of hazards. Determine the operation

for which protection is desired and the recommended safety device is listed in adjoining column. *E. D. Bullard Co.*

IT'S NEW ✓ CHECK IT

(15) STEEL VALVES. Composite, sectional catalog in loose-leaf binder gives complete coverage of manufacturer's line of valves. Varicolored inserts include descriptions and dimensions of all valves. Contains price list and index for easy reference. *The Edward Valve & Manufacturing Co., Inc.*

IT'S NEW ✓ CHECK IT

(16) PNEUMATIC TRANSMISSION of instrument readings over long distances is covered in detail in survey of 12 pages. This new transmission system employs two spring-and-bellows assemblies, matched as to characteristics. Advantages and limitations of speed and response are based on actual tests. Includes charts and summary of recommendations. *Brown Instrument Co.*

IT'S NEW ✓ CHECK IT

(17) "FLUID PROGRESS." Multicolored bulletin describes improvements in plant operations. Explains how catalytic-cracking process works. Fold-out, four-color, flow diagram of a modern complete unit indicates the flow of three principal streams—catalyst, oil, and air—through 22 items of equipment. Isometric sketch and tables of yields included. *M. W. Kellogg Co.*

IT'S NEW ✓ CHECK IT

(18) CORROSION RESISTING PAINTS. A guide for formulating and specifying paint for structural iron and steel. Tabulated for quick, easy reference. Gives essential properties and functions of a metal protective primer. Booklet contains various characteristics of red lead, its function in paint, and formulas for a representative group of general-purpose and specification paint primers. Data consist of illustrations, charts, and and formulas. *National Lead Co.*

IT'S NEW ✓ CHECK IT

(19) WELDING RODS. A 24-page booklet describes manufacturer's welding rods and their applications. Also explains procedure for bronze welding iron and steel, oxyacetylene welding, carbon-arc welding, metal-arc welding, and the use of backup bars and plates. *The American Brass Co.*

IT'S NEW ✓ CHECK IT

(20) VALVES AND FITTINGS catalog of 40 pages covers line of manufacturer's products giving description, dimensions, and sizes of hose-nozzle valves, angle-check valves, line-loading valves, lever-throttle valves, gate valves, truck tank faucets, cross valves, relief valves, and parts and accessories. Illustrations and cutaway drawings show structural features. *Milwaukee Valve Co.*

IT'S NEW ✓ CHECK IT

(21) STAINLESS STEEL AND ELECTRODE correlation data sheet lists every well-known stainless steel by trade name with the proper alloy electrode for welding each. A.I.S.I. type numbers and analyses of the trade-named stainless steels are given, as well as the weld-metal chemical analysis of the corresponding electrodes. *Arcos Corp.*

IT'S NEW ✓ CHECK IT

(22) PRESSURE REGULATING VALVES for steam, air, and gas. Booklet contains detailed cutaway drawings and capacity tables for reducing valves, regulators, strainers, and separators. Operation and installation are also emphasized. *Strong, Carlisle & Hammond Co.*

IT'S NEW ✓ CHECK IT

(23) HARD-FACING GUIDEBOOK. Handbook selects the alloy producing long service life, considering such factors as initial cost and speed of application. Also provides a quick source of information as to the type and amount of rod for equipment commonly used, brief hints on the hard-surfacing procedures, life expectancy after hardfacing, and explanatory drawings indicating proper placement of the hard metal deposits. *Stoody Co.*

IT'S NEW ✓ CHECK IT

(24) AUTOMATIC FLOW RESPONSIVE EQUIPMENT for continuous treating, sampling, blending, and diluting in process operations. Photographs of chemical proportioning equipment and typical installations are supplemented by many flow diagrams and detailed drawings. Operation of the equipment is demonstrated by two-color diagrams. *% Proportioneers, Inc. %.*

IT'S NEW ✓ CHECK IT

(25) HELICOID GAGE is technical catalog on pressure gages. Cutaway photographs and line drawings show the complete line of manufacturer's gages, how they work, what goes into them, and how they are assembled. *Helicoid Gage Division, American Chain & Cable Co., Inc.*

IT'S NEW ✓ CHECK IT

(26) "THE VAPORSPHERE" is a new 15-page bulletin covering construction, operation, and uses of evaporation saving equipment for oil, chemical, and pressure storage tanks. Vapor pressure, expansion of air-vapor mixture, and the flow of vapor in lines are easily read from charts. Contains pictures, statistics, and graphic descriptions of vapor-saving systems. *Chicago Bridge & Iron Co.*

IT'S NEW ✓ CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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NATURAL GAS

Action Planned to Avert Midwest Gas Shortage

CHICAGO.—Means of meeting a prospective shortage of natural gas this winter in the seven-state midwestern area served by Panhandle Eastern Pipe Line Co. were sought in a hearing here last week before a Federal Power Commission examiner.

At a recess in the hearing, representatives of state utility commissions attending agreed to return to their states with suggestions that state action be taken while the over-all situation is being examined by FPC. State action suggested included at least some limitation by distributing companies on future house-heating business and refusal to take more future industrial customers on an interruptible basis.

Meanwhile, FPC announced in Washington it had authorized Panhandle Eastern to begin installation of additional compressor units pending a public hearing of the proposal later. The company proposed to spend $2,865,000 to install eight additional units totaling 12,200 hp. in various stations to increase the system's capacity in view of the greater demands for natural-gas service.

The shortage arises from the marked expansion of home heating by gas. Home owners are showing preference for the cleaner and more convenient gas fuel over coal which has risen in cost and is facing an uncertain labor outlook. Numerous gas utilities in the Middle West draw their supply from Panhandle Eastern's system. Industrial customers also are asking more fuel. Some 45 major manufacturing companies take gas from distributors served by Panhandle Eastern while 32 others are direct customers.

Statements at the Chicago hearing indicated total demand for gas on zero-temperature days may hit a high of 500,000,000 cu. ft., against Panhandle Eastern's estimated capacity January 1 of 403,000,000 cu. ft. daily. O. W. Martin, Panhandle Eastern's vice president in charge of operations, said the difference between the firm-load consumer requirements for the coming winter and the system's capacity was 28,000,000 cu. ft. daily. Various utility companies have submitted data, he said, showing their gas requirements after curtailing interruptible customers would reach an estimated 433,000,000 cu. ft. daily.

A.A.R. Urges Regulation Of Natural-Gas Pipe Lines

WASHINGTON.—A natural-gas pipe line is a transportation facility and should be regulated as such in the same manner as railroads, truck lines, and water carriers, it is contended by the Association of American Railroads in a brief filed with Federal Power Commission in connection with the natural-gas investigation.

In choosing a fuel, says the A.A.R., a consumer is usually guided by the cost, and the major element of cost is generally transportation. From this point it argues that a gas line is a carrier for hire, competing with other fuel carriers, and that the federal Government's regulation of gas lines should be solely on this basis.

In order to treat gas carriers like other carriers regulated by the federal Government, the A.A.R. says, the Natural Gas Act should be amended to regulate rates for direct sales to industrial users, to give FPC power to fix minimum, as well as maximum, rates just as Interstate Commerce Commission does when competing carriers get into a cutthroat rate war, and to permit competing carriers to intervene in gas rate cases as well as in cases involving certificates for new construction.

Although all briefs were scheduled to be filed by October 1, a few are still straggling in and are being incorporated in the record. One of the last to arrive was from the city of Houston, which made a plea for the FPC to consider the convenience and necessity of the originating areas as well as of the delivery area when passing on applications to build new gas-transmission lines.

Joint Reserves Report Due

NEW YORK.—The American Gas Association's natural-gas reserves committee is reported to be preparing to collaborate with the American Petroleum Institute's oil-reserves committee on a joint oil and gas reserves report to be issued annually. Heretofore, each organization has issued separate reserves reports.

Natural Gasoline

Light-Products Output Shows Continued Rise

Production of natural gasoline and other light products in August gained 355,000 bbl. daily over July to average 13,102,000 bbl. daily during the month, according to the monthly report of the Bureau of Mines.

Another natural-gasoline report, that of the Natural Gasoline Association of America covering the Mid-Continent and Gulf Coast areas, showed that the increasing production trend continued through September in those areas. The N.G.A.A. report listed September output of all grades of natural gasoline only at 4,330,936 gal. daily against an August production of 4,257,432 gal. daily. On a 26-70 equivalent basis, production in September was 5,116,527 gal. daily, against 5,068,797 gal. daily in August.

The Bureau of Mines report for August, which covers L.P.G. and cycled products as well as natural gasoline, showed production gains occurred in all states except Illinois, Michigan, Louisiana, New Mexico, Montana, and California. Total production in Texas rose from 184,929,000 gal. in July to 196,842,000 gal. in August.

Stocks at plants, terminals, and refineries decreased 16,519,000 gal. during August to 291,496,000 gal., according to the bureau report. At the end of the month, stocks included 216,590,000 gal. of natural gasoline, 41,876,000 of L.P.G., and 33,030,000 gal. of other products.

Companies Seek to Use Waste Turner Valley Gas

CALGARY, Alta.—Applications are being made to the Natural-Gas Utilities Board of Alberta in connection with the disposal of 3,000,000 cu. ft. daily of waste vapor from the processing of Turner Valley gas. These vapors, obtained in separating gasoline from the wet gas in absorption plants, could, it is claimed, be utilized for production of liquefied gas to supply Alberta communities.

Madison Natural Gas Co., subsidiary of Royalite Oil Co., after a series of experiments has evolved a practicable process and is seeking authority from the board to install the necessary equipment. Applications are also being made by Barber Machinery Co. to handle te waste vapors for production of liquefied gas and antifreeze; and by Standard Chemical Co. of Toronto for chemical manufacture including formaldehyde.

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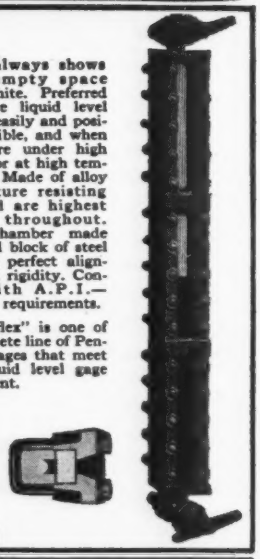

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REFINING

Shell Oregon Asphalt Plant Goes on Stream

SAN FRANCISCO.—Described as a miniature refinery, Shell Oil Co., Inc.'s new asphalt plant in Portland, Ore., has gone on stream to mark the beginning of the company's first manufacturing facility in the Pacific Northwest.

Construction of the plant was begun last January and went ahead steadily, despite difficulty in obtaining some materials. The plant receives two grades of charging stock by tank ship from the Martinez, Calif., refinery.

The charging stock is run into insulated storage tanks and then as needed into a furnace. It then goes to the fractionating columns which separate the different products for later blending. Five grades of asphalts are manufactured and blended at the plant.

Shell officials said completion of the plant fills a long-felt need in the area, since previously all paving grades of asphalt have been shipped by tank car from California. The long freight hauls involved delays, freight costs, loss of heat in transit, and disruption to contractors working schedules, they added.

More than $400,000 was spent in the entire asphalt project, some $300,000 for the Portland plant and the remainder for pipe lines, storage tanks, and pumps at Martinez.

Pollution Prevention Topic Of Baton Rouge Meeting

BATON ROUGE, La.—Methods of preventing stream pollution from refinery waste were discussed at a recent meeting of representatives of five Louisiana refineries and state officials at Standard Oil Co. of New Jersey's Baton Rouge refinery.

Speakers included T. E. Landry and H. E. L. Sesse, of the Baton Rouge refinery's oil-conservation department; George Ullrich, of the refinery's process-control laboratory; and Roland Abegg, Louisiana State University advanced zoology student who reported on his experiments on the effect of waste toxicity on fish. The organization, known as the Petroleum Waste Disposal Group, plans four meetings a year in the future, according to Dr. Jarvis E. Miller, head of the oil-conservation department of the Baton Rouge refinery.

OPA Clarifies Ruling on Petroleum Chemicals

WASHINGTON.—The Office of Price Administration has issued an interpretation of its action of last September removing price controls from petroleum chemicals and products made predominately from petroleum. Under the new ruling, price controls do not apply to products produced by petroleum refineries listed as such in the special refinery issue, March 30, 1946, of The Oil and Gas Journal, nor 100 per cent owned subsidiaries of companies so listed.

Booklet Describes Fluid Catalytic Improvements

Major improvements in basic design of fluid catalytic-cracking units

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show definite advantages for the small refiner, according to data in a new brochure recently released by M. W. Kellogg Co., petroleum engineers of Jersey City and New York.

The brochure, "Fluid Progress," describes major improvements in basic design made since the end of the war which, it says, simplify the unit, give lower investment costs and higher operating efficiency. These improvements include lower over-all height of structure which uses less steel, and design which increases recovery of oil vapors and catalyst.

Synthetic Rubber Awaits Action by Congress

WASHINGTON.—The future of the synthetic-rubber industry must be determined by Congress early next year, and government and private agencies are preparing their recommendations.

Natural rubber is now returning to the world markets in increasing quantities, and before many months it is probable that sufficient crude will be available to meet most United States needs unless the Government takes some action to protect the war-built synthetic industry. Rather than a protective tariff, this action probably would be permanent continuance of present requirements that a certain percentage of synthetic rubber be included in all passenger car tires.

The international agreement under which the Government buys all crude rubber at fixed prices is due to expire January 1, and after that date it is probable that United States rubber companies can do their own purchasing abroad, though there is discussion in government quarters of various forms of restrictions to keep the supply spread among all users. A more important date is March 31, the expiration of the War Powers Act under which the Civilian Production Administration requires the use of synthetic in tires. Unless some sort of control is continued, the public's preference for "natural" over "synthetic" products might eventually eliminate the market for synthetic tires.

The announced program of the Interdepartmental Rubber Policy Committee is to have private industry operate a substantial part of the synthetic-rubber facilities. However, few oil companies operating butadiene plants, or tire companies operating copolymer plants, are anxious to invest huge sums in buying these facilities until they know just how this policy is going to be put into effect. If the synthetic industry is assured of a minimum market, say one-third of our normal rubber consumption, private capital undoubtedly will take over the more efficient government plants and engage in research to improve the processes and the products.

Unless Congress acts early next spring it is likely that the Government will begin closing down some of its synthetic plants, and the dwindling market for GR-S rubber will not inspire a rush of applications to purchase them. Imports of natural crude have increased so much that last week CPA raised the percentage that may be used in making passenger car tires. Formerly limited to 13 per cent, natural rubber may now be used up to 23 per cent in small and medium tires and up to 67 per cent in large passenger tires.

Shale Process Described

WASHINGTON.—German and French methods for extracting oil from oil shale are described in a report now available, the Office of Technical Service, Department of Commerce, announced last week. The report was prepared by William W. Odell and E. L. Baldeschweiler, members of the technical oil mission which made a thorough survey of the German fuel industry in 1945 under the sponsorship of the Technical Industrial Intelligence Committee (now Division) of OTS. Copies of the report are distributed free.

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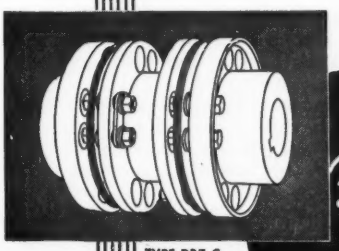

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PIPE LINES

Big-Inch Investigation To Open November 19

WASHINGTON.—A thorough review of the plans and policies for disposing of the Government's two big-inch pipe lines is promised by the special House committee investigating War Assets Administration.

Rep. Roger C. Slaughter of Missouri, chairman of the committee, announced that hearings on the big-inch will open November 19 and run perhaps a week. Among witnesses invited to appear are WAA officials, the 16 bidders for the lines, Harold L. Ickes, former petroleum administrator for war; John L. Lewis, president of the United Mine Workers of America; Jesse Jones, former head of the Reconstruction Finance Corp., and anyone else interested.

The committee's staff of investigators has already laid the groundwork through an extensive investigation, and Chairman Slaughter said the hearings will be a thorough-going inquiry to find out how the interests of the country can best be served in disposal of the lines. Government agencies affected by the problem will be asked to present their views, and the oil, gas, coal, and railroad industries will have an opportunity to give evidence.

WAA officials, who have already had some uncomfortable sessions before the Slaughter committee, say they are taking this new investigation in their stride and are proceeding with their previous plans to make an award to one of the 16 present bidders on the basis of the policy they proposed to Congress last January.

Committee attaches say it will make no difference in the investigation if WAA should announce an award on the eve of the hearings. They take the position that WAA did not consider all factors when it established the policy of giving preference to bidders proposing to use the lines for oil, that Congress has not formally approved this policy, and that property of this size cannot be sold until a specific proposal has been submitted to Congress.

The WAA attitude is that Congress approved the policy when it failed to raise objections to the January report, and that therefore WAA is free to make a valid sale or lease without further reference to Congress.

Presumably the Slaughter committee invited Ickes because his war agency engineered and operated the lines and as a newspaper columnist he has lately been highly critical of WAA; Jesse Jones because his war agency financed and owned the lines; and John L. Lewis because the coal miners oppose conversion of the lines to natural gas. These three national figures have no love for each other personally, and should they all take the stand the hearings should be interesting, but it will be more important to the oil and gas industries if the committee goes into the economics of the problem and the effects on these industries of the various proposals for peacetime use of the big-inch and little big-inch.

Tax Collection Upheld

WASHINGTON. — Interstate pipe lines traversing Tennessee must pay the inspection fee imposed by the state upon public utilities, under a court decision recently affirmed by

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the United States Supreme Court.

Tennessee Natural Gas Co., the company involved in the case, filed suit to recover $12,540 in inspection fees collected from it as a public utility, contending it was not a public utility as defined by Tennessee law but a Delaware corporation owning and operating an interstate line. The trial court held that the company's charter gave it power to operate as a public utility and that it was engaged in interstate commerce as a utility. Tennessee law imposes a fee for the inspection, control, and supervision of public utilities and provides that the fee be measured by the gross receipts of the company.

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Cities Service Gas Opens New Oklahoma Line

OKLAHOMA CITY.—A new 64.5-mile, 12-in. gas pipe line, which will take part of the now-vented gas in Oklahoma's West Edmond field, has been placed in operation by Cities Service Gas Co.

The line, which extends from the field to near Drumright where the gas enters the company's trunk system, will handle approximately 30,000,000 cu. ft. daily initially. Capacity will be increased to 60,000,000 cu. ft. daily with the construction of additional stations later.

For the operation of the line, raw gas is purchased in the field and compressed at the plant of Phillips Petroleum Co. and Continental Oil Co. in Edmond field. This plant was recently expanded, and a gathering system installed in West Edmond field.

Construction of the line commenced in August but was delayed by difficulty in obtaining material. Much of the line pipe was salvaged from a field in Kansas. Cities Service Gas officials and employes observed starting of runs last week at an affair at the Drumright station which was sponsored by the Doherty Men's Fraternity.

Reduction of the West Edmond gas waste has been sought by Oklahoma conservation officials in recent months. Early in September, the Corporation Commission took drastic action and slashed the field's allowable from 77,000 to 40,000 bbl. daily in a move to curtail gas venting.

It was reported last week that a second pipe-line project to handle the field's gas output may be delayed indefinitely because of the lack of available materials. This project is planned by Oklahoma Natural Gas Co.

Richardson Heads Arizona Project

Frank E. Richardson is president of Arizona Pipe Line Co., a subsidiary of the holding company, Arizona Petroleum Corp. which also controls Phoenix Refining Co. Richardson, formerly with Great Lakes Pipe Line Co. and Pan American Pipe Line Co., is the designer and sponsor of the Arizona pipe-line project for building a 600-mile, 8-in. crude-oil line from West Texas to Phoenix, Ariz., which is to be constructed when arrangements for equipment are completed. Del Webb has been recently elected to the boards of directors of this group of affiliated companies. Webb operates as a contractor in Arizona. A report on refinery, pipe-line, and marketing aspects of these projects is being prepared by Ebasco Services, Inc.

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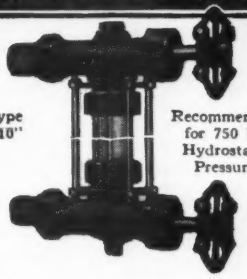

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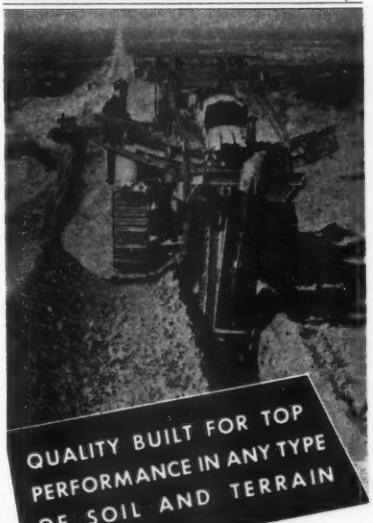

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STATISTICS and T

WEEKLY WELL COMPLETIONS . . . WEEK ENDED NOVEMBER 2, 1946

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1946				
	Comp.	Oil	Gas	Dry	Footage	1946	1945	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	32	16	0	*16	45,812	1,332	1,239	0	0	0	0	0	0	0	0	0	0
Pennsylvania	75	40	6	†29	111,987	3,343	3,441	0	0	0	0	0	0	0	0	0	0
West Virginia	16	3	11	2	48,849	630	685	0	0	0	0	0	0	0	0	0	0
Ohio	27	7	8	12	60,341	1,053	822	0	0	0	2	2	3	0	12	35	50
Indiana	3	1	0	2	6,559	315	164	0	0	0	0	0	4	0	0	16	20
Kentucky	12	3	0	9	25,071	398	459	1	0	0	2	3	7	0	0	33	40
Illinois	43	22	0	21	107,863	1,945	1,512	2	0	0	11	13	49	0	1	385	435
Michigan	17	5	2	10	40,817	684	637	0	0	0	7	7	20	0	7	216	243
Kansas	39	12	7	20	125,413	1,657	1,464	1	0	0	10	11	27	0	1	217	245
Neb., Mo., Iowa	1	0	0	1	3,537	16	19	0	0	0	1	1	0	0	0	12	12
Oklahoma	89	51	6	‡32	262,292	2,420	1,995	3	0	0	16	19	78	0	34	309	421
Texas	129	71	12	46	603,291	6,595	6,033	5	0	1	21	27	187	26	31	1,088	1,332
North Texas	40	18	1	‡21	100,785	2,322	1,838	4	0	0	6	10	64	0	4	443	511
West	34	29	0	5	170,120	1,456	1,482	1	0	0	0	1	46	0	1	146	193
Panhandle	0	0	0	0	0	273	464	0	0	0	0	0	0	0	0	5	5
Eastern	17	7	7	3	98,976	604	300	0	0	0	2	2	16	2	4	83	105
Gulf Coast	26	14	4	8	190,613	1,452	1,405	0	0	1	5	6	42	22	13	225	302
Southwest	12	3	0	9	42,797	488	544	0	0	0	8	8	19	2	9	186	216
Louisiana	27	17	2	8	169,251	1,157	893	0	1	0	5	6	43	11	7	159	220
Northern	14	7	2	5	46,545	657	371	0	0	0	4	4	9	0	2	88	99
Southern	13	10	0	3	122,706	500	522	0	1	0	1	2	34	11	5	71	121
Arkansas	3	1	0	2	9,454	151	150	0	0	0	0	0	7	0	0	32	39
Mississippi	1	0	0	1	7,012	204	310	0	0	0	1	1	1	0	1	56	58
Southeastern States	0	0	0	0	0	36	50	0	0	0	0	0	1	0	0	30	31
Montana	7	4	2	1	18,016	268	270	0	0	0	1	1	10	0	2	28	40
Wyoming	3	2	0	1	5,118	142	187	0	0	0	1	1	11	0	3	32	46
Colorado-Utah	6	4	0	2	33,018	136	47	0	0	0	2	2	4	0	0	16	20
New Mexico	5	4	1	0	30,010	340	362	1	0	0	0	1	4	0	0	33	37
California	17	10	0	7	82,333	1,302	1,914	2	0	0	7	9	25	0	4	192	221
Total United States	552	273	57	222	1,796,044	24,124	22,653	15	1	1	87	104	481	37	103	2,889	3,510
Total previous week	590	333	65	192	1,923,193	23,572	22,098	13	1	1	64	79	466	36	102	2,802	3,406
Total Nov. 3, 1945	555	279	52	224	2,018,733			13	1	1	69	84	443	20	115	2,900	3,478

Service wells included: *16, †29, ‡2.

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Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$1.17	....	....	....
19-19.9	1.21	....	$1.41	....
20-20.9	1.24	$1.20	1.43	1.07
21-21.9	1.28	1.22	1.45	1.09
22-22.9	1.32	1.24	1.47	1.11
23-23.9	1.35	1.26	1.49	1.13
24-24.9	1.39	1.28	1.51	1.15
25-25.9	1.43	1.30	1.53	1.17
26-26.9	1.46	1.32	1.55	1.19
27-27.9	1.50	1.34	1.57	1.21
28-28.9	1.54	1.36	1.59	1.23
29-29.9	1.57	1.38	1.61	1.25
30-30.9	1.61	1.40	1.63	1.27
31-31.9		1.42	1.65	1.29
32-32.9		1.44	1.67	1.31
33-33.9		1.46	1.69	1.33
34-34.9		1.48	1.71	1.35
35-35.9		1.50	1.73	1.37
36-36.9		1.52	1.75	1.39
37-37.9		1.54	1.77	1.41
38-38.9		1.56	1.79	1.43
39-39.9		1.58	1.81	1.45
40 and above		1.60	1.83	1.47

*Includes Lea County, New Mexico.

(Quotations shown here are f.o.b plant in tank cars and in cents per gal. as of last Monday.

REFINERY GASOLINE

Octane (A.S.T.M.)	78-78½†	73-75
Mid-Continent*	7.375-7.625	6.625-7.000
Tex. Gulf Coast	7.250	6.500-6.750
New York Harbor	8.750-9.500	7.750-8.500
California		6.250-6.750

*Basic Oklahoma Group 3. †1939 C.F. R. (research method).

NATURAL GASOLINE

Grades—	26-70	18-55
Oklahoma (Group 3)	4.750	5.706
N. Texas (f.o.b. plant)	4.250	5.100
N. Louisiana (f.o.b. plant)	4.500	5.400
California (averages)	5.500	6.250

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.60
Kettleman Hills, California*	1.69
Beauregard Parish	1.55
Illinois Basin	1.72
Pecos County, Texas	1.30
Bradford, Pennsylvania	3.41
Eastern Ill., and Western Ind.	1.57

Note: Crude prices exclusive of sub-

A.P.I. REFINERY REPORT

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks— Gaso-line	Dis-tillate	Resid-ual
East Coast	713	20,175	24,239	12,458
Appalachian	147	3,134	765	619
Ill., Ind., Ky.	824	15,060	8,877	5,681
Okla., Kan., Mo.	361	8,702	3,411	1,296
Inland Texas	231	2,875	640	726
Tex. Gulf Cst.	1,171	13,256	10,585	8,027
La. Gulf Cst.	361	4,778	3,740	2,280
N. La., Ark.	60	1,684	470	218
Rocky Mt.	132	1,427	587	718
California	758	15,332	12,185	28,849
Total 10-26-46	4,758	86,423	65,499	60,872
Total 10-19-46	4,779	85,930	64,761	60,512
Total 10-27-45	4,791	74,514	44,827	46,547

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended—	Bbl. of crude*
October 26, 1946	221,184,000
October 19, 1946	220,774,000
October 27, 1945	224,230,000

*Excludes unrefinable Calif. stocks.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	Nov. 2 crude oil	B. of M. Oct. demand	Oct. 26 crude oil
Alabama	1,000	1,200	1,050
Arkansas	78,050	77,000	78,200
California	876,900	850,000	875,400
Colorado	36,850	32,000	37,140
Eastern	66,750	64,200	67,500
Florida	.....	200	.....
Illinois	210,250	214,000	202,750
Indiana	18,900	19,000	18,600
Kansas	279,100	264,000	280,350
Kentucky	30,100	30,000	30,050
Louisiana	402,000	383,000	401,800
North Louisiana	96,400	.....	96,200
South Louisiana	305,600	.....	305,600
Michigan	48,845	47,000	45,900
Mississippi	77,505	60,000	76,105
Montana	24,650	24,000	24,660
Nebraska	750	800	750
New Mexico	99,100	100,000	99,100
Oklahoma	362,450	384,000	355,850
Texas	2,046,550	2,120,000	2,046,550
District 1 (Southwest)	19,450	.....	19,450
District 2 (Southwest)	144,800	.....	144,800
District 4 (Southwest)	214,300	.....	214,300
District 3 (Gulf Coast)	449,300	.....	449,300
District 5 (Eastern)	40,000	.....	40,000
District 6 (Eastern)	102,450	.....	102,450
East Texas field	316,000	.....	316,000
District 7C (West)	27,450	.....	27,450
District 8 (West)	484,700	.....	484,700
District 7B (W. Central)	33,500	.....	33,500
District 9 (N. Central)	129,700	.....	129,700
District 10 (Panhandle)	84,900	.....	84,900
Wyoming	107,980	100,000	107,810
Miscellaneous other	.....	600	.....
Total United States	*4,767,730	4,771,000	4,749,565
Change from prev. wk., up	18,165		

Total production January 1-November 2 ..... †1,452,691,384 bbl.
Same period last year (crude, plus condensate) 1,440,450,925 bbl.
*Not incl. 22,670 bbl. condensate. †Incl. 7,367,450 bbl. condensate.

CRUDE-OIL STOCKS 221,184,000 bbl. as of October 26—up 410,000 bbl. One year ago 224,230,000 bbl.

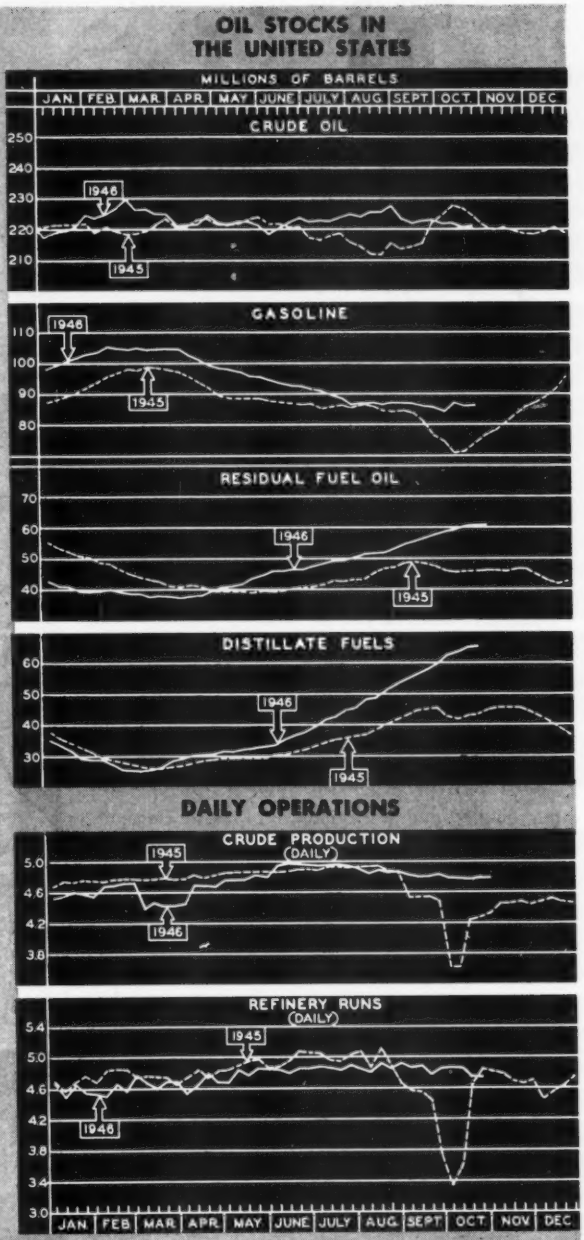
GASOLINE STOCKS 86,423,000 bbl. as of October 26—up 493,000 bbl. One year ago 74,514,000 bbl.

RESIDUAL FUEL-OIL STOCKS 60,872,000 bbl. as of October 26—up 360,000 bbl. One year ago 46,547,000 bbl.

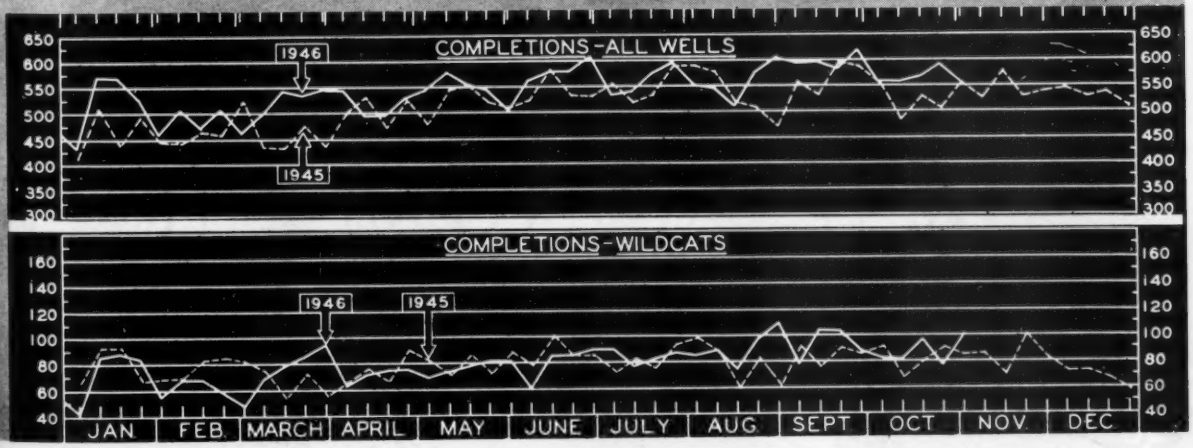
GAS OIL AND DISTILLATE STOCKS 65,499,000 bbl. as of October 26—up 738,000 bbl. One year ago 44,827,000 bbl.

CRUDE-OIL PRODUCTION 4,790,400 bbl. as of November 2—up 18,165 bbl. One year ago 4,313,950 bbl.

REFINERY RUNS 4,758,000 bbl. daily week ended October 26—down 21,000 bbl. One year ago 4,791,000 bbl.



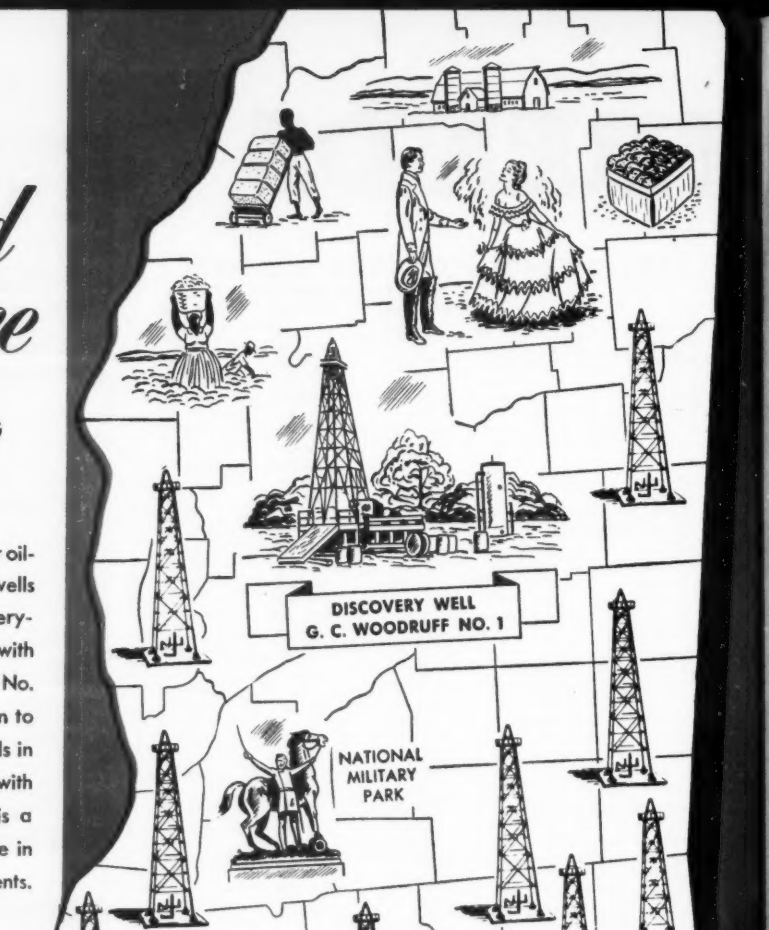
Solid line charts weekly completions, service wells in Eastern area included.



Pre-tested performance

IN THE FAST-GROWING MISSISSIPPI AREA

MISSISSIPPI is coming into its own as a major oil-producing center, with 726 producing wells in 19 fields as of September, 1946. Oil men everywhere will find it significant that, beginning with Mississippi Discovery Well — G. C. Woodruff No. 1, Yazoo County, in August, 1939 — right down to the present time, the bulk of the producing wells in this fast-growing area have been cemented with Lone Star Cements. Significant, because this is a further measure of the Oil Industry's confidence in the quality and performance of these Cements. Lone Star Cements cover the entire range of Oil Field requirements . . . pre-tested to assure the specific properties that Oil Men need . . . geared to Oil Industry progress by continuing research. Protect your investment . . . use these pre-tested Oil Field cements . . . select the one that fits your job.



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Exploration and Drilling

A New Cockfield Trend?

BARNSDALL OIL CORP. 1 Long Bell Lumber Co., NW SW NE 1-6s-10w, Beauregard Parish, Louisiana, in a 20-minute drill-stem test in the upper Cockfield recovered 20 stands of 46°-gravity oil in 20 minutes at 8,241-62 ft. This is the second well drilled on a block held by Barnsdall, the first test being in the SE 11-6s-10w, about ¾ mile west and 1¼ miles south of the apparent discovery.

The first well went to 12,825 ft., and did not test the Cockfield, although the electric log indicates two good sand sections in it, one at 8,532-74 ft., followed by a probable shale break, and then a second sand at 8,676-8,722 ft. This well was deemed structurally low. The second test, after the favorable results in what is believed to be the upper sand section in the Cockfield, will core and test carefully to see if the second sand section is present and above the water line. Structurally the second test appears to be running nearly 300 ft. higher than the first.

If a well-developed sand section with good permeability is found productive here it may mean the opening of an east-west trend of Cockfield pools. Farther south along the T-P trend, a string of good Frio production pools has been developed. North of the present test, in the Neale field, Wilcox production has been found.

Going north from the T-P trend, the Frio tends to tighten and shale up. Apparently coming south from the Neale field, the Wilcox tends to tighten up and lose permeability and porosity, possibly shaling up. Some geologists have been inclined to believe that sand development would be poor in all formations in the area in between. Others have held that coming up out of the Gulf basin, good sand development would be found in belts, the younger formations closer to the coast, and the older formations falling into place up dip. If the Cockfield sand is well developed over any substantial area around the present test, and produces in substantial quantity, more Cockfield plays will undoubtedly be made looking for a belt where sedimentary conditions were right for good sand development. Thus there might eventually develop a belt of Frio production to the south, then in the next belt north, Cockfield production, then to the north of that, Wilcox production.

Regionally the present test is on a local structure, north of, and on the up-throw side of the faults associated with the T-P trend, and on the south plunging nose of the Sabine uplift. There is nothing in this regional picture to make unreasonable a belt of local structures with good sand development, if the regional sedimentation picture in Cockfield time was favorable to the accumulation of a thick sand section.

APPALACHIAN FIELD

Oriskany Test Drills 66 Ft. of Onongado

PITTSBURGH.—On the west flank of the Driftwood anticline in Bell Township, Clearfield County, Pa., F. C. Deemer, in the important test on Alice Irvin farm, topped the Onondaga lime at 7,424 ft., and drilled to 7,490 ft. This section has been extremely hard and flinty and it is believed the hole is nearing the Oriskany caprock. In the test drilled west of the present wildcat some years ago, the Onondaga section was between 60 and 70 ft.

In Springhill Township, Greene County, Stanley Furman et al are completing a test on W. G. Miller farm in the Fifth sand which has filled up several hundred feet with oil. It may open new drilling.

New locations totaled 9 in Allegheny, Armstrong, Fayette, Greene, Indiana, Jefferson and Westmoreland counties.

In the Poca district, Kanawha County, West Virginia, Columbian Carbon Co. completed a second test, H. H. Parsons, good for 50 bbl. from the Big Lime, total depth 1,754 ft.

In Ravenswood district, Jackson County, Columbian Carbon completed 915 J. V. Hall in the Oriskany sand with a final open flow after shot of 3,018,000 cu. ft., total depth 5,038 ft. Their No. 908 Elmer Curry was dry through the Oriskany sand.

In Baileysville district, Wyoming County, United Producing Co. completed 1,369 W. M. Ritter Lumber Co. in the Berea with a final gage of 3,823,000 cu. ft., total depth 3,372 ft.

In Slab Fork district, Wyoming County, Owens Libby Owens topped the Corniferous Lime at 6,614 ft. in the deep wildcat on Western Pocahontas Corp., and shut down to run 5½-in. casing to 6,623 ft. With an elevation of 2,018 ft., this places Corniferous Lime top at —4,596 ft.

New locations totaled 29 in Barbour, Boone, Braxton, Calhoun, Fayette, Gilmer, Harrison, Jackson, Kanawha, Lewis, Lincoln, Logan, Raleigh, Ritchie, Roane, Tyler, Wayne, Wetzel, and Wyoming counties.

TEXAS GULF COAST

Lucky Field Gets ¼-Mile Extension

HOUSTON.—The Lucky field in Matagorda County has been extended ¼ mile south on the west side by Stanolind Oil & Gas Co. 4 Franz Huebner. A deep test for this field, the well was drilled to 14,109 ft. Tests made between 10,000 and 12,000 ft. showed salt water with slight flow of gas, and operators plugged back and completed through perforations at 8,938-42 ft. On potential gage is flowed 129 bbl. of fluid daily through a 16/64-in. choke, 40 per cent water and the remainder 37°-gravity oil. Tubing flowing pressure was 300 psi., and 1,050 psi. on the casing. The 7-in. casing was cemented to 11,674 ft. and 5-in. liner run from 11,524-12,109 ft.

Production at Sugar Valley field, also in Matagorda County, has been extended 933 ft. to the east by Skelly Oil Co. 2 W. T. Robertson, in the Freeman Pettus Survey. On potential gage it flowed 148 bbl. of 31°-gravity oil daily through a ⅛-in. choke. This is the third well to be completed in the 8,900-ft. strata. Tubing flowing pressure was 1,250 psi., with production from perforations at 8,954-66 ft. Top of the sand saturation was 8,934 ft., and gas-oil ratio 1,538 cu. ft.

In the Altair field, Colorado County, Superior Oil Co. continues to test for a new deep pay at 4-A Mrs. Myra S. Pryor. Drilled and cored to 11,366 ft., an initial production test through perforations at 10,-238-66 ft. developed a slight gas flow and recovered a small amount of gas-cut mud when tool was pulled. From perforations from 10,266-86 ft. it developed a slight gas blow and died. Operators swabbed the well and it started flowing gas, mud and salt water through a ¾-in. choke with 120 psi. on the tubing.

Jack W. Frazier 1 Houston Deep Water Land Co., a wildcat in Harris County, continues operations on a major fish job. Hole was drilled to 8,379 ft., where it started blowing gas out of control. After recovering 21 stands, the drill pipe became stuck and at latest report it is still in the hole. Top of fish is around the 3,300-ft. level.

Second test for the Tidehaven field in Matagorda County, Magnolia Petroleum Co. 2 Live Oak Farms, in Wallace League, on production test through perforations at 8,360-8,678 ft. started flowing in 48 minutes with 500 psi. pressure, but slowly dropped off to zero, and when tool was pulled, recovered 630 ft. of oil and 7,700 ft. of salt water. These perforations have been squeezed and another test will be made. Drilled to 10,000 ft. with pipe set on bottom operators previously had perforated from 9,914-9,919 ft. where salt water was recovered.

The 20 new locations reported for the Upper Gulf Coast district included 3 wildcats, 1 each in Jackson, Jefferson, and Matagorda counties. Old Ocean field in

Brazoria County, Saratoga field in Hardin County, Fannett field in Jefferson County, and Sugar Valley field in Matagorda County, each received 2 new starts. Brazoria and Harris counties each received 1 dry wildcat. Six development wells were oil producers while 2 were dry, with Sugar Valley field in Matagorda County taking the lead reporting 3 producers.

WILDCAT FAILURES UPPER GULF COAST TEXAS

Brazoria County: Lee Bros. Oil Co. and Shuart et al 1 R. T. Schwartz, HT&B Sur., 1 mi. NW of Pearland townsite, dry, TD 5,642 ft.

Harris County: Sun Oil 1-A Independence Gardens Unit, WCRR Survey, 2 mi. W of Fairbanks townsite, dry, TD 8,240 ft.

SOUTHWEST TEXAS

New Gas Discovery NW of Richard King Pool

CORPUS CHRISTI.—In northwest Nueces County, approximately 1 mile north of Richard King field, Jack Little, Trustee, 1 Mrs. Emma Rieber, wildcat discovery well in the Casa Blanca grant, gaged 35,000,000 cu. ft. of dry gas per day on open flow through perforations at 5,150-55 ft., with shut-in pressure of 2,055 psi. The well flowed 2,895,000 cu. ft. of gas per day through a ¼-in. choke, with 1,960 lb. tubing pressure. Total depth is 5,797 ft.

Joe C. Palmer 1 Jas. F. Welder Heirs, wildcat approximately 1 mile west of Seven Sisters field in Duval County, recovered 460 ft. of clean pipe-line oil in a 15-minute drill-stem test at 2,596-2,600 ft. using ¼-in. chokes. Mirando sand was topped at 2,596 ft. Electrical log has been run and operators are setting casing for completion. The Cole sand at 1,723-28 ft., and Lower Government Wells sand at 2,400-37 ft., had oil odor but these zones were not tested.

Jones and Morgan have asked for a discovery allowable for their 1 W. Ford, in the West Sinton field, San Patricio County. Drilled to a total depth of 5,231 ft., completion was through perforations at 3,462-68 ft., flowing 151 bbl. per day net oil through a ¾-in. choke, with 50 psi. tubing pressure, making 89 per cent salt water, no gas, gravity 21°. This well is completed in a pay zone slightly below the regular field pay.

F. P. Schwab et al 2-A Anastacio Garcia is the second oil producer in the Yegua zone at "Charco Redondo" field in Zapata County, 660 ft. south of 1-A Garcia oil discovery well in this zone. Schwab has asked for discovery allowable rights for these two wells and that the area be named "East Charco Redondo." The 2-A Garcia was drilled to a total depth of 1,685 ft., and pumped 58 bbl. per day from open hole at 1,675-85 ft. Production is from the Yegua topped at 1,680 ft., gravity is 26°, no water.

F. M. Boykin, Jr. 3 H. H. Hutto has been completed in a new pay zone at Midway field, in San Patricio County. Total depth is 6,057 ft., but the test is flowing pipe-line oil through perforations at 5,685-86 ft., gas-oil ratio 1,380 cu. ft. Located on the southwest flank of the Midway field, it is 330 ft. south of Boykin's 1 Hutto, recently completed in a new pay at the 5,100-ft. level, called the "Hutto" sand.

There were 40 new locations reported this week with 5 being wildcats, 1 each in Karnes, Live Oak, Victoria, Zapata, and Zavala counties. Charlotte field received 3 starts, Jourdanton 4, Kelsey-Deep 6, and Falls City 4. Twelve wildcats were completed, 1 a new gas pool in Nueces County, and 11 dry holes as follows: 1 each in Atascosa, Bee, Bexar, Duval, Edwards, Gonzales, Jim Hogg, Kleberg, McMullen, Webb, and Willacy counties. A total of 11 oil wells were completed, 4 gas, and 13 dry holes.

SOUTHWEST TEXAS SUCCESSFUL WILDCAT

Nueces County: New gas pool—Jack Little, Trustee, 1 Mrs. E. V. Rieber, in J. J. de la Garza Montemayor & Sons "Casa Blanca" grant, approx. 1 mi. N Richard King field, top pay 5,150 ft., TD 5,797 ft., perf. 5,150-55 ft., PT fl. 9,040,000 cu. ft. gas per day through a ½-in. choke, TP 1,440 psi., SI pressure 2,055 psi., no water.

SOUTHWEST TEXAS WILDCAT FAILURES

Atascosa County: H. R. Smith and Skinner & Eddy Corp. 1 Mrs. Ada Tom, in John Benson Survey 148, Abstract 72, northwest of Fashing field, dry, TD 3,678 ft.

Bee County: H. H. Howell 1 A. E. Moreman, J. T. Malloy Sur., 1 mi. N of Skidmore, dry, TD 5,008 ft.

Bexar County: H. S. Stahl 1 C. Koehler, in N. Montoya Survey 21, 2 mi. N of Eckert field, dry, TD 852 ft. in Navarro zone.

Duval County: Santa Clara Oil Co. and Progress Pet., Inc. et al 1 Mary Dunn Meaney et al, in Diego Hinojosa grant, 7½ mi. N of Hebbronville, dry, TD 4,152 ft.

Edwards County: Dan Auld 1 Hal and C. V. Peterson, 6 mi. NE of Rock Surings, in AB&M Survey, dry, TD 4,500 ft.

Gonzales County: K. D. Owen-G. D. Beauchamp 1 Frank Kunetka, J. D. Kirkpatrick Survey, 4 mi. NW of Cheapside, dry, TD 6,655 ft. in Wilcox, no shows.

Jim Hogg County: Newman Bros. Drlg. Co. et al 1 Julian Vela Pena, in Patel area, M. W. White subd. in L. Bartlett Survey, dry, TD 2,977 ft.

Kleberg County: Stanolind 1 J. O. Johnson, Juan Mindiola grant, 3 mi. SE of Kingsville, dry, TD 8,895 ft.

McMullen County: C. H. Lewis and Chas. Daubert 1 Ellen Atkinson, AB&M Sur. 125, 3 mi. NE of Loma Alta field, dry, TD 2,018 ft.

Webb County: Ross & McCartney 1 E. T. Laubscher, 30 mi. NW of Laredo, in Joaquin Galan Sur. 2292, dry, TD 4,770 ft.

Willacy County: Humble 1 Sauz Ranch-Tenerias, Share 64, S. J. de Carricios grant, 6½ mi. NE of Willamar field, dry, TD 12,501 ft.

SOUTH LOUISIANA

Gulf Opens New Pay in St. Martin Parish Field

NEW ORLEANS.—A new producing sand for the Section 28 Dome field, St. Martin Parish, has been opened by Gulf Refining Co. 3-A Ruth Fleming et al, 28-9s-6e. Drilled to a total depth of 13,125 ft., the well gaged 491 bbl. of oil in 24 hours from perforations at 10,698-742 ft. through a ⅞-in. choke with 1,600 psi. flowing pressure in tubing. The 7-in. casing was cemented to 11,133 ft.

A prospective new pool opener in the Cockfield, Barnsdall Oil Co. 1 Long Bell Lumber Co., wildcat 4 miles north of the Gordon field, 1-6s-10w, in the Goode area, recovered 20 stands of 46°-gravity oil on a 20-minute drill-stem test with fair working pressures. Operators are preparing to core ahead from total depth of 8,262 ft.

The second test for North Oretta pool of Beauregard Parish will be Magnolia Petroleum Co. 1-E Lutcher-Moore, ¼ mile north of the 1 Witzki discovery, in NW NE 22-6s-11w. Proposed depth is 9,100 ft. The discovery well was completed from saturated sands logged from 8,422-40 ft. in January 1946.

In the area approximately 1 mile northeast of the Delta Duck Club field of Plaquemines Parish, The Texas Co. has made two new locations for exploratory drilling. The 18-State Delta Club is located in 33-20s-20e, and the 19 State-Delta Duck Club is in 4-21s-20e. Both tests are projected to 10,000 ft. using company tools.

Ten new locations, including 4 wildcats, were reported this week. Calcasieu and Plaquemines parishes each received 2 wildcat starts. Two wildcats, a gas-condensate pool opener in Plaquemines Parish, and a dry hole in Acadia Parish were completed. Development well completions included 9 oil and 2 dry.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Plaquemines Parish: New gas-condensate pool—The California Co. 4 E. P. Brady, Unit 4, Alliance area discovery, approx. 3 mi. SE of Bayou de Fleur field, 19-16s-24e, TD 14,187 ft., perf. 9,072-82 ft., PT 60 bbl. condensate per day and 3,660,000 cu. ft. gas per day through ¼-in. choke flowing, TP 3,100 psi., shut-in 3,250 psi., gravity 49°, no water.

SOUTH LOUISIANA WILDCAT FAILURE

Acadia Parish: Harry Fotiades and Bateman Drlg. Co. 1 Willis & Lantz, Iota area, 14-8s-2w, dry, TD 10,005 ft.

PERMIAN BASIN

Important Ector County Wildcat Announced

MIDLAND.—An important exploratory test in northeastern Ector County was scheduled last week. It is Plymouth Oil Co. et al 1 E. V. Headlee, Section 34, Block 41, Township 1s, in the T&P Survey. Location is 10 miles northeast of Odessa, and 12 miles west of Midland, on a 2,900-acre block assembled by P. W. Anderson and associates, with checkerboard acreage held by Plymouth. Projected depth is 5,000 ft.

In western Ector County, Samedan Oil Co. 1 TXL, prospective east extension well in the Devonian of the Wheeler field, was running casing to test at 8,632 ft. At this level, it was running some 395 ft. lower on the Devonian than the next location to the west. However, a drill-stem test at 8,629-58 ft. showed gas in 7 minutes and unloaded 51 stands of oil when the tool was closed. With oil and gas found below the water table in the field, and the gas show light, operators are not too confident of good production.

Second Polar field test.—Humble Oil & Refining Co. 1 Irene Elkins, 26-5, H&GN Survey, ¾ mile northeast of the field's discovery, became the second producer for a potential of 240 bbl. of oil, surpassing the first well's 207-bbl. initial production. The 1 Elkins found the Ellenburger at 7,787 ft., 5,461 ft. subsea, which was said to be some 20 ft. lower than the discovery. The 240-bbl. flow was through ¾-in. tubing choke from perforations at 7,795-7,825 ft. after two acid treatments. The oil is 40.9-gravity and gas-oil ratio was 1,359 to 1. In addition to the oil, the well made 120 bbl. of salt water a day.

The 1 Elkins was the fourth well to be drilled in this area. Previous completions, both dry, were Humble 1 B. A. Moore, ½ mile west of the discovery, which was stopped at 7,978 ft., and American Liberty 1 Connell-Young, 1½ miles northwest of the discovery, which was plugged at 7,925 ft. Both wells were in the Ellenburger. The next scheduled test is Humble 1 O. N. Blair, to be located 1 mile south-southwest of the discovery. It will go to 8,500 ft., or through the Ellenburger, if necessary.

Clear Fork extension.—Shell Oil Co., Inc., 1-B Scharbauer, second Clear Fork producer in the Goldsmith field, and a northwest extension, was completed with a flow of 498 bbl. of 40-gravity oil in 24 hours,

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in contrast to a previous test of 141 bbl. of oil. Gas-oil ratio was 970 to 1 and basic sediment was less than 1 per cent. The flow was through a 20/64-in. tubing choke, from perforations at 6,102-6,292 ft., after a two-stage acidization.

Block 12 field.—A 1-mile east extension of Tubbs production was assured last week when Plymouth Oil Co. 1-A University, SW NE 16-12-U, swabbed 160 bbl. of oil and 80 bbl. of water in 24 hours. It was given one acid treatment of 8,000 gal. Operators continued swabbing at 7,250 ft., total depth. Plymouth 1-B University, 1¾ miles northwest of the Block 12 discovery, was drilling below 7,470 ft. in lime.

Reeves County discovery.—While operators have not released estimates on the amount of production expected, 500-bbl. storage is being erected at Argo Oil Corp. 1 Dora Roberts, Section 294, Block 13, H&GN Survey, some 13 miles northeast of Balmorrhea. It continued swabbing at plug-back depth of 11,990 ft., while moving in testing equipment.

WEST TEXAS SUCCESSFUL WILDCAT

Glasscock County, new discovery: Shell Oil Co., Inc., 1 A. C. Clark, Sec. 5, Blk. 32, Twp. 4s, T&P Sur., 8 mi. NE of Garden City, flowed 238 bbl., 56.5°-gravity oil and 15 bbl. salt water per day, 15/64-in. choke on 2-in. at 9,707 ft., GOR 3,878 to 1, casing sealed, tubing pressure 1,280 lb., top Mississippian pay 9,740 ft., TD 10,970 ft. in granite, PB 9,775 ft., elev. 2,663 ft.

SOUTHEAST NEW MEXICO

HOBBS.— Northeastern New Mexico's closely watched test, Humble Oil & Refining Co. 1 Northcutt, 32-8n-37e, was given up last week at total depth of 7,520 ft. in lime and shale, with elevation of 4,477 ft. Information on sample tops was not available at the week's end. Location is 16 miles east of Grady, N. M., and 1 mile west and ¼ mile north of Humble 1 Hyslop, Deaf Smith County, Texas, which had reported shows of oil.

Location for Grayburg Oil Co. 13-B Keeley, in 26-17s-29e, north central Eddy County, was reported last week. The wildcat will go to 5,000 ft. to explore the Glorieta section of the middle Permian, according to word here. Location is 1 mile southwest of the same operators 10-A Keeley, which is shut down at 6,854 ft. Unofficial sources reported this test to have picked up slight shows of oil at 4,752-68 ft., 4,802-25 ft., and 4,840-50 ft. A small amount of free oil was said to have been bailed. Both tests are on the southwest flank of the Grayburg-Jackson field, where present production is from the upper Permian, around 3,600 ft.

In eastern Lea County, between Lovington and Hobbs, and on the north flank of the original Hobbs field, Sun Oil Co. 1-B McKinley, pre-Permian wildcat in 20-18s-38e, was drilling below 6,911 ft. in middle Permian lime. Operators reported oil stains at 6,900 ft. and indicated tests would be made if greater porosity is found. Good stains were also found at 6,793-6,815 ft. but with no porosity.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: Neville G. Penrose, Inc., 3 Hinton, SE SW 12-22s-37e, 1 mi. east extension to Penrose-Skelly field, flowed 7½ bbl. oil a day, TD 7,386 ft. in granite, PB to 5,736 ft. in Tubbs, top pay 5,160 ft., elev. 3,345 ft.

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CANADIAN FIELDS

Large Gas Area Proved At Pinhorn Dome Field

CHATHAM.—Official figures on recent completions in the Pinhorn Dome field of southern Alberta show that McColl Frontenac-Union 7C, LSD 7, 6-4-8w4, finished at 2,207 ft. with 15,500,000 cu. ft. open flow; McColl-Union 4-B, LSD 4, 16-3-8w4, finished at 2,201 ft. with 8,000,000 cu. ft. initial open flow; McColl-Union 6-D, LSD 6, 12-4-8w4, abandoned at 2,200 ft., and McColl-Union 11-A, LSD 11, 35-2-8w4, is nearing completion. Thre three gassers indicate a possible producing area 4 miles square, and the test now drilling is approximately 4 miles south and a little east of the nearest production.

Jumping Pound.—On the Jumping Pound structure in the foothills west of Calgary, Shell 16-14-J, LSD 16, 14-25-5w5, bottoming in Madison limestone at 10,578 ft. is testing, with wet gas flow of 1,270,000 cu. ft., with some oil and water.

Fort Augustus.—In northern Alberta, Fort Augustus 1, LSD 7, 29-55-21w4, joint test by Anglo-Canadian, Home Oil and Calgary & Edmonton Corp., is approaching the lime below 3,111 ft. after drill-stem tests showed some gas in the Viking sand.

Eyremore.—In the Eyremore district, southern Alberta, Sun CPR 1, LSD 11, 8-18-16w4, encountered oil and gas shows in the Sunburst and is drilling below 3,718 ft. after contacting Madison limestone at 3,556 ft.

Lloydminster.—In the Lloydminster field, Midfield 7, LSD 15, 26-47-1w4, finished at 1,959 ft. after drilling the Sparky sand and a lower oil horizon. Both are being tested. Ten wells in the field which have completed drilling are waiting for service units for drilling in and testing.

Gaspe.—In the Gaspe Peninsula of Quebec, Venture 1 is in hard dense limestone below 1,761 ft. with oil shows first encountered at 1,581 ft. persisting.

MICHIGAN

25 New Locations Announced

SAGINAW.—Five small oil wells, 2 gas producers and 10 dry holes were completed in Michigan oil and gas fields in the past week as 25 new locations were announced for tests in 11 counties. Wildcatting results show no improvement, seven more of those completions being added to the dry hole list.

New production came from a 30-bbl. producer in Clayton-Arenac; a 7-bbl. well in Forest-Genesee; a 99-bbl. flowing well in Coldwater-Isabella; a 60-bbl. completion in Norwich-Missaukee, and a 37-bbl. well in Arbela Township, Tuscola County. The wildcat failures were in seven counties, the drilling depths ranging from 303 ft. in Oakland County to one that went to 4,520 ft. in Pioneer Township Missaukee County.

Six of the 25 new locations are for Consumers Power Co. gas tests in Clare's Winterfield County. Other locations included 4 in Allegan County, 3 in Isabella, 2 each in Mecosta, Montcalm, Osceola and Van Buren, 1 each in Gladwin, Ionia, Ogemaw and Ottawa.

MICHIGAN WILDCAT FAILURES

Gratiot County, Wheeler Township: Smith Petroleum Co. 1 Shankel, SE SW SE 33-12n-1w, dry, TD 1,154 ft.

Lake County, Yates Township: Byron MacCallum, Tr. 1 Tope, NW SW SW 22-17n-12w, dry in Monroe, TD 3,469 ft.

Mecosta County, Aetna Township: Merrill Drilling Co. 1 Stephenson, SE NW NE 12-13n-10w, dry in Dundee, TD 3,547 ft.

Missaukee County, Pioneer Township: Freeman Oil Co. 1 Smith, NE NW NW 8-24n-7w, dry, TD 4,520 ft.

Newaygo County, Dayton Township: H. E. Walton 1 Schuitman, SE SE SE 16-13n-14w, dry in Traverse, TD 2,301 ft.

Oakland County, Independence Township: Mikhel Sherman 1 DeLinde, NW NW NW 21-4n-9e, dry, TD 303 ft.

Wexford County, Clam Lake Township: Gulf Refining Co. 1 Jacobson, NE NE SE 11-21n-9w, dry in Detroit River, TD 4,016 ft., plugged back to 3,915 ft.

EASTERN TEXAS

Hill County Smackover Test Drilling Ahead

DALLAS.—The western edge of the East Texas area, 3 miles southeast of the town of Aquilla, in Hill County, last week was the scene of a new Smackover lime test that will be watched with interest. A. P. Merrit and Stegall Drilling Co., of Kilgore, Tex., started drilling at their 1 Henry Nors, in the F. A. Tabor Survey, and expected to find the Smackover around 3,500 ft. Location is some 4 miles west of a shallow test, drilled earlier this year, that was dry at 1,013 ft.

Smith County deep test.—Delta Drilling Co. 1 Boynton, Smith Survey, east and north of the Mount Sylvan pool, and 2 miles southwest of the townsite, found its first marker, chalk, at 3,250 ft. The Mount Sylvan discovery had the chalk at 3,157 ft. Projected depth is around 11,000 ft.

Leon County.—Two miles southeast of Flynn, United North & South Development Co. 1 Oden, W. Martin 7 Survey, reported a 15-minute drill-stem test in the Woodbine at 6,972-7,216 ft. recovered 500 ft. of water cushion and 175 ft. of oil and gas-cut mud. Tests at 7,345 ft. were unsuccessful, but a test at 7,228-36 ft., using ½-in. bottom choke and 630 ft. of water cushion, returned a slight blow and recovered 1,440 ft. of gas-cut mud with a slight show of oil, in addition to the cushion. Bottom-hole pressure was 4,000 lb. It was shut in and operators were preparing to drill deeper.

Mount Sylvan extended.—Development was extended across the Smith County line into Van Zandt County, last week, when Humble Oil & Refining Co. made location for a new southwest flank exploration at its 1 Hattie Jackson, in the Thomas Horsley Survey. Lease boundaries are the south and west banks of the Neches River, which divides the two counties. The 1 Jackson location is 1,560 ft. southwest of Humble 2 Pool, William Sanders Survey, Smith County, which was drilling below 6,702 ft. in lime and shale toward the Paluxy pay.

EAST TEXAS WILDCAT FAILURES

Cass County: Atlas Oil & Ref. 1 Laura Thomas, W. G. Anderson Sur., 7 mi. SE of Naples, dry, TD 5,507 ft., no tops reported.

Panola County: Gulf Oil Corp. 1 S. B. Wallace "A," A. M. McLaughlin Sur., 5 mi. NE of Deadwood, dry, TD 6,749 ft., sample tops, Saratoga 1,443 ft., Blossom 2,131 ft., Austin 2,377 ft., Paluxy 2,940 ft., Glenrose 3,250 ft., James lime 5,595 ft., Pettit 5,925 ft., Travis Peak 6,427 ft., Travis Peak sand 6,731 ft., no shows, elev. 312 ft.

LA.-ARK.

New Distillate Discovery For Catahoula Parish

SHREVEPORT.—In northeastern Catahoula Parish, about 12 miles due west of the Lake St. John field, The California Co. 2 Tensas Delta, 13-9n-7e, was bottomed at 8,581 ft., in shale, and on a 2-hour production test, flowed 81 bbl. of 62.2°-gravity distillate. Flow was through 5/32-in. tubing choke and was accompanied with 1,138,000 cu. ft. of gas a day. Tubing pressure was 2,125 lb.

Location is about 2 miles south of a previous distillate discovery but the two areas are separated by a dry hole at California 1 Tensas Delta, in 12-9n-7e, which was recently gone into and plugged back from 9,215 ft. to test at 8,608 ft. Results were not announced but the test was said to be temporarily abandoned.

In Concordia Parish, some 15 miles west and 5 miles north of the town of Vidalia, Penrod Drilling Co. 1 J. P. Mitchell, 36-8n-7e, reported fair shows and was stopped at 9,346 ft. Cores at 9,317-37 ft. recovered 5 ft. of gray, slightly sandy shale, and 15 ft. of ashy porous sand, with streaks of oil stain. Cores at 9,337-46 ft. recovered 5½ ft. of gray sandy shale, with oil odor and salty taste.

Completion of a big gas-distillate well in the Knowles field, Lincoln Parish, was reported last week for R. W. Williams 1 Cooper, 25-20n-4w. Although potentials have not been made, it is estimated good for 75,000,000 cu. ft. of gas a day and 50 bbl. of distillate.

The well was completed in the Bodcaw of the Cotton Valley series, with total depth of 8,432 ft. Perforations were at 8,287-8,345 ft., with packer set at 8,250 ft. Top of the Bodcaw was 8,280 ft. When the well was opened, it cleared the water column and gas pressure rose rapidly to 3,000 lb. when the packing in the ½-in. choke blew out. Operators shut it in until separators are installed. Newest production is The California Co. 1 James, which checked 50 ft. lower on structure than the 1 Cooper. Penrod Drilling Co. drilled the 1 Cooper for W. C. Feazel, of Shreveport.

NORTH LOUISIANA WILDCAT FAILURES

Caddo Parish: R. W. Norton, Jr., 1 Collins, C NE SE 4-22n-15w, dry, TD 3,050 ft., no tops reported.

Madison Parish: C. H. Murphy, Jr. and Sun Oil Co. 1 Ashley Plantation, NW SE SE SE 13-17n-10e, dry, TD 4,764 ft., chalk 3,388 ft., Gas Rock 3,414 ft., no Tuscaloosa, Paulxy 3,425 ft., Bromide 3,634-710 ft., sand 3,752-88 ft., 3,812-29 ft., 3,949-70 ft. and 4,00-09 ft., Upper Glen Rose 4,220-40 ft., Lower Glen Rose 4,395-408 ft., anhydrite stringer 4,545-60 ft., Massive anhydrite 4,731 ft.

Rishland Parish: Houston Oil and British American Oil Co. 1 Godfrey, E/2 SW SE NW 25-16n-6e, dry, TD 3,320 ft., Midway 1,930 ft., Tuscaloosa 2,435 ft., anhydrite 3,304 ft.

Sharp-King et al 1 M. W. Wooten, C NE NW NE 36-15n-5e, dry, TD 5,142 ft., Tuscaloosa 3,041 ft., Lower Cretaceous 3,822 ft., anhydrite 5,030 ft.

N. CENTRAL TEXAS

New Field Opened in Montague County

WICHITA.—Another small oil pool was in sight for northeastern Montague County, last week, when Eason Oil Co.'s 1 Temple Yarbrough Trust, 4 miles north of the town of St. Jo, F. J. Bellow Survey, made a drill-stem test at 4,074-94 ft., in the Strawn. Open 1 hour, it showed gas in 4 minutes, and recovered 100 ft. of free oil, 180 ft. of oil-cut mud, and 150 ft. of salt water. Operators set casing at 4,045 ft. for production tests on last report.

Two miles southwest of St. Jo, Nu Enamel Oil Operating Co.'s wildcat, 1 George & Roy Perry, in the L. S. Farrar Survey, was drilling below 6,168 ft. Two miles southwest of the town of Bowie, Continental Oil Co. 1 G. L. Griffin, William Bartee Survey, was drilling below 5,349 ft. in shale and sand streaks. The test is projected to 6,800 ft.

West central deep tests.—Two deep tests were scheduled last week that will be of interest to operators. In Callahan County, 1½ miles northeast of Baird, Edward C. Lawson and Anderson Prichard Oil Corp. will drill the 1 J. A. Hutchison, a 4,400-ft. rotary test, in the BBB&C Survey. In Jones County, North American Oil Consolidated Co. 1 J. M. Arnett, is a 4,600-ft. Palo Pinto test in Section 46, Block 2, SP Survey.

Clay County.—R. C. Lipscomb has staked location for 1 K. N. & L. T. Hapgood "A," in Block 78, Marion County School Lands Survey, for a 6,600-ft. rotary test. Location is some 8 miles north of the Bellevue pool, in the old Worsham area, where production has been found from the Pennsylvanian, around 3,600 ft., to the Ellenburger near 6,000 ft. The scheduled drilling depth is expected to penetrate and test all zones. In the same area, about 7 miles southeast of the town of Henrietta, Jack Grace 1 Bryant Edwards "C," in the S. C. Beldon Survey, was drilling below 5,125 ft. in shale. In the Ross field, A. R. Dillard's deep test, the 3 Ross Brothers, William Walker Survey, was reported temporarily abandoned at total depth of 5,684 ft., in dolomite, with shows of oil found at 5,602-25 ft. Operators are expected to retest at a later date.

Cooke County.—Ten miles southeast of Gainesville, J. L. Hodges Survey, Sun Oil Co.'s 1 O. P. Cason was drilling below 3,523 ft. in shale after finding shows of oil. Cores taken at 3,147-55 ft. recovered 2 ft. of shale, 6-in. of hard black oil sand, 8-in. of shale, 4-in. of hard sand speckled with oil, and 4½ ft. of shale. Cores at 3,155-65 ft. returned only 1-in. of sand with a showing of oil in the top. Cores at 3,397-3,405 ft. recovered sandy shale, with a slight show of oil. Stains and odor were found from 3,506-18 ft.

NORTH TEXAS SUCCESSFUL WILDCATS

Throckmorton County: Fred Manning, Inc., 1 M. K. Graham estate, 2½ mi. NE of Woodson, Sec. 985 TE&L Sur., flowed 113 bbl. oil in 5 hr., 18/64-in. choke,

perforations 3,834-50 ft. in Caddo lime, topped at 3,828 ft., casing pressure 1,000 lb., tubing pressure 700 lb., GOR 650 to 1, elev. 1,267 ft.

Fred M. Manning, Inc., 2 McKnight "D," Sec. 4, Day Land & Cattle Co. Abst. 1,266, 6 mi. SE of Throckmorton, flowed 160 bbl. 43°-gravity oil in 4 hr., 20/64-in. choke, potential 960 bbl. a day, casing pressure 800 lb., tubing pressure 600 lb., GOR 1,100 to 1, Caddo lime 4,037-42 ft., TD 4,219 ft., elev. 1,305 ft.

Wichita County: Consolidated Oil Co. 1 J. T. Harrell estate "A," Sec. 4, Blk. 2, Denton Co. School Land Sur., 7 mi. SW of Wichita Falls, lime and saturation 4,427-37 ft., pumped 10 bbl. of oil a day, TD 4,437 ft.

NORTH TEXAS WILDCAT FAILURES

Baylor County: F. R. Gillespie 1 F. Motula, Sec. 221, T&NO Sur., 1¼ mi. NW Rendham, dry, TD 2,602 ft. in shale.

Montague County: Honolulu Oil Corp. 1 S. G. Cooke, J. W. Carter Sur., 4 mi. NE of Bonita, dry, TD 4,368 ft. in shale, Gunsite lime 987 ft., Home Creek 1,300 ft., sand with show of oil 3,400-14 ft., DST recovered 5 ft. of oil, 180 ft. oil-cut mud and 2,200 ft. salt water.

Wichita County: C. N. Percifield 1 Ecklecamp, Sec. 245, Waggoner Col. Subd., 3 mi. N of Electra, dry, TD 2,002 ft. in sand.

J. N. Wolf 1 Lucy L. Myers, Sec. 830, TE&L Co. Sur., 14 mi. NE of Electra, dry at 2,001 ft., sand with show of gas at 1,897-1,907 ft.

WEST CENTRAL TEXAS SUCCESSFUL WILDCAT

Brown County: Keeiner & Heltzel 1 O. B. Fomby, J. Beck Sur., 3 mi. SE of Cross Cut, pumped 38 bbl. oil and 140 bbl. water per day, Ellenburger 3,136-51 ft., TD 3,151 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Comanche County: Hickok & Reynolds 1 John E. Leazor, Sec. 27, D&DA Sur., 4 mi. N of Sipe Springs, dry at 784 ft.

Taylor County: S. B. Roberts & A. C. Scott 1 Margery Ray, Sec. 5, EL&RR Sur., 15 mi. SW of Merkel, dry at 3,508 ft., no tops available.

MISSISSIPPI

Deep Wildcat Ready For Production Tests

JACKSON.—Mississippi's deepest test, the Superior Oil Co. wildcat, 1 Cassie Bradford, located 7 miles south of Hattiesburg, near the airport, was reported ready for production tests last week at total depth of 15,683 ft. Electric log was run but information on tops was not available at the week's end. Seven-inch casing was set at 12,180 ft. in the Massive sand and a gas show will be tested at that level.

In the Brookhaven field, Lincoln County, Roeser & Pendleton, Inc., completed their 2 R. Batson, 10-1n-16w, which flowed at the rate of 640 bbl. of oil a day through ⅛-in. choke. Flowing pressure was 500 lb. Roeser & Pendleton have five rigs in operation here, with three working on company tests and two on contracts for Sun Oil Co. The company was also reported to be ready to move into its new offices and warehouse recently constructed just north of Brookhaven.

MISSISSIPPI WILDCAT FAILURE

Issaquena County: Burns & Miller 1 Mohanna, NE NW 11-18n-3e, dry, TD 7,012 ft., Cook Mountain 1,140 ft., Sparta 1,327 ft., Wilcox 2,675 ft., Midway 4,587 ft., Gas Rock 5,040-80 ft., Eutaw 5,180 ft., 1st sand 5,371 ft., Tuscaloosa 5,730 ft., Marine Tuscaloosa 6,160 ft., Massive sand 6,531-90 ft.

CALIFORNIA

Development Wells Nearing Objectives in New Fields

LOS ANGELES.—More accurate appraisal will be possible within a few weeks on newly discovered productive areas in the Los Angeles basin as development wells in the Alondra and Anaheim Sugar fields reach their drilling objectives.

Meanwhile, California operators continued their interest in deep projects in the San Joaquin Valley, one of which is within approximately 200 ft. of establishing a new depth record for the state.

Pacific Western Oil Corp. 1 National Royalties, 5-26s-22e, in the Miramonte area, Kern County, almost equidistant between the Lost Hills, Semitropic and Trico fields, was last reported drilling at 16,025 ft., about 220 ft. above the California drilling depth record established in 1945 by Standard Oil Co. 20-13 KCL at Coles Levee which was carried to 16,246 ft. Loffland Bros. Co., the contractor, made 245 ft. of new hole last week.

Two tests are drilling and a new location was announced for the Alondra field, near Inglewood, a few miles west of the heart of Los Angeles. This area, formerly called Gardena, was discovered by The Texas Co. and British-American Oil Producing Co. 1 Borger in August. The discovery well, completed for initial production of 1,040 bbl. daily from 9,087 to 9,154 ft. in the conglomerate of Jurassic age, has sustained production at a satisfactory rate. The remaining question, of course, is the areal extent of the reservoir. Most advanced of the two drilling wells at Alondra is British-American 1 Alondra Park, 22-3s-14w, which was last reported preparing to whipstock under the park property at current depth of 6,158 ft. In 26-3s-14w, The Texas Co. et al 9-1 Gardena community is drilling at 3,537 ft.

The other comparatively new producing area in which several drilling operations are nearing the objective pay is now called the Anaheim Sugar pool, which probably will eventually prove to be part of the Huntington Beach field. One new producer, the second for the Anaheim Sugar area, was in process of completion at end of last week. The new well is L. & W. Oil Co., Ltd., 1 Surf, 13-6s-11w, which flowed about 120 bbl. of 22.6°-gravity net oil through 18/64-in. choke from plugged back depth of 4,468 ft.

Amerada Petroleum Corp. 64-7 Anaheim Sugar, 7-6s-10w, is drilling at 5,470 ft. Amerada staked location for 75-7 Irvine, 360 ft. south and 990 west from the east quarter corner of 7-6s-10w, and plans to drill a second well on the Anaheim Sugar property. Morton & Sons (formerly A. W. Lyddon, Operator) 7-1 Irvine, 7-6s-10w, has 7-in. pipe cemented at 5,410 ft. and will complete in the pay producing in the discovery well. Hole was carried to 5,973 ft. and plugged back to 5,560 ft. Morton & Sons 7-1 Holtz, 7-6s-10w, is drilling at 5,340 ft. and Barnhard-Morron Consolidated 2 Alford, 18-6s-10w, is drilling at 3,545 ft.

California operators staked locations last week for 48 new tests. Wilmington development locations totaling six headed the list from a standpoint of concentrated drilling. The Cymric field in Kern County and the Brea field in Orange County were in second and third positions, with five and four new locations, respectively. In the previous week, California had accounted for 40 new locations.

CALIFORNIA SUCCESSFUL WILDCATS

Orange County, Huntington Beach area: L. & W. Oil Co., Ltd., 1 Surf, 13-6s-11w; 120 bbl. 22.6°-gravity oil and 500,000 cu. ft. gas, 18/64-in. choke; TD 5,460 ft., PB 4,468 ft.; tubing at 3,723 ft., packer at 3,690 ft.

Ventura County, Del Valle area: Superior Oil Co. and British-American Oil Producing Co. 1-A Black, 13-4n-18w, 106 bbl. 23.8°-gravity crude; TD 2,420 ft.

CALIFORNIA WILDCAT FAILURES

Orange County, Yorba Linda area: General Exploration Co. 1 Marshburn, 23-3s-9w, dry, TD 5,466 ft.

Huntington Beach area: Morton & Sons (formerly A. W. Lyddon, Operator) 1 Crew community, 32-5s-10w, dry, TD 9,752 ft.

West Newport area: Tide Water Associated Oil Co. 1 Aldrich, 13-6s-11w, dry, TD 5,044 ft.

Kern County, South Belridge area: Clyde Oil Co. 56-8 Hopkins, 8-29s-21e, top brown shale 3,628 ft.; dry, TD 3,909 ft.

Round Mountain area: Petrol Corp. 5 KCL-Claire, 13-28s-28e, top Pyramid Hills 2,242; top Vedder 2,347; dry; TD 2,360 ft. in gray sand.

Stanislaus County, Ripon area: Tide Water Associated Oil Co. 34-16 Overton, 16-5s-7e, dry, TD 6,054 ft.

Monterey County, San Lucas area: The Texas Co. 1 Cooper, 19-21s-9e, dry, TD 3,094 ft.

ILLINOIS

Wabash County Discovery Pumps 300 Bbl. Daily

MATTOON.—The Magnolia Petroleum Co. 2 W. J. Pfeiffer, NE NW NE 11-2s-14w, Wabash County discovery, was completed last week on pump for 300 bbl. of oil daily. The well is producing naturally from the Cypress sand at 2,679-84 ft., total depth, and has been cut back voluntarily to 60 bbl. per day. It is located about 2½ miles east and slightly south of producing wells in the South Browns pool.

Also in Wabash County, the Gilliam-Aspin Drilling Co. et al 1 A. & H. Hering, NE NE SW 27-1s-14w, has extended the Browns pool about ¾ mile to the east. On the latest test the well flowed and pumped 115 bbl. of oil in 12 hours from the Levias lime at 2,965-69 ft., a new pay zone for the area.

Seven new oil pools, one extension to a pool, and five new pay zones were discovered in Illinois in October, according to the monthly oil and gas drilling report of the State Geological Survey. New pools were Beaver Creek South in Clinton County, Concord North and Crossville in White County, Hoosier North in Clay, Junction North in Gallatin, Maud North in Wabash, and Wakefield in Jasper. The extension was to the Covington East pool in Wayne County. New pays were the Levias lime in Covington East, Herald, and Olney East, the Rosiclare lime in Olney East, and the Palestine sand in the Stokes-Brownsville pool.

ILLINOIS SUCCESSFUL WILDCATS

Jasper County: John W. Rudy 1 Dewhirst, SE NE SE 16-5n-9e, pumped 40 bbl., perf. 3,108-09 ft., 3,116-17 ft., 3,124-25 ft., 5,000 gal. acid, Rosiclare 3,109-22 ft., TD 3,184 ft.

Wayne County: Robinson & Puckett 1 Dunlap, SW SW NE 14-1s-6e, pumped 60 bbl., 160-qt. shot at 3,056-72 ft., Aux Vases sand 3,047-74 ft., TD 3,260 ft., PB 3,077 ft.

ILLINOIS WILDCAT FAILURES

Adams County: Harry Miller 1 Fee, SW NW SE 12-1n-5w, dry at 570 ft., Devonian 558 ft., Silurian 568 ft.

Edgar County: Ernest Zink 1 R. E. Wihport, NW NW SE 18-12n-13w, dry at 540 ft., no log.

Effingham County: Inland Oil Co. 1 Fuenneman, NW NW SE 3-8n-6e, dry at 2,515 ft., Rosiclare 2,378 ft., McClosky 2,406 ft.

Franklin County: Indiana Farm Bureau 1 U. S. Fuel Co., NE NE NE 2-6s-4e, dry at 3,414 ft., Tar Springs 2,595 ft., Glen Dean 2,678 ft., Cypress sand 2,946 ft.,

Benoist 3,102 ft., Aux Vases 3,202 ft., Ste. Genevieve 3,292 ft., McClosky 3,379 ft.

Gallatin County: C. E. Brehm 1 Fuhrer & Ford, NW NW SW 21-7s-10e, dry at 2,960 ft., Ste. Genevieve 2,813 ft., McClosky 2,842 ft.

Lawrence County: J. S. Young, Jr., 1 E. Highsmith heirs, NE NE NE 4-2n-11w, dry at 1,909 ft., Ste. Genevieve 1,765 ft., McClosky 1,833 ft.

Moultrie County: R. D. Burns & Cruse 1 Winngs, SW SW NW 22-15n-5e, dry at 1,802 ft., Glen Dean 1,460 ft., Cypress sand 1,578 ft., Benoist sand 1,620 ft., Renault 1,698 ft., Aux Vases sand 1,709 ft., Ste. Genevieve 1,753 ft., St. Louis 1,798 ft.

St. Clair County: J. L. Jeffries 1 M. Lans, NW NE NE 25-1n-10w, dry at 643 ft.

Shelby County: C. G. Davis 1 H. Pate, NE NW NW 9-11n-4e, dry at 1,930 ft., Glen Dean 1,507 ft., Cypress sand 1,646 ft., Benoist 1,759 ft., Aux Vases sand 1,855 ft., Ste. Genevieve 1,893 ft.

Wayne County: Phillips Pet. Co. 1 Golden, SE SE NE 28-1s-9e, dry at 3,467 ft., Cypress 2,914 ft., Benoist 3,090 ft., Renault 3,196 ft., Ste. Genevieve 3,260 ft., McClosky 3,301 ft., St. Louis 3,465 ft.

White County: R. B. Tuley 1 A. J. Walker, NE SE NE 32-6s-10e, dry at 3,122 ft., Tar Springs 2,326 ft., Glen Dean 2,384 ft., Cypress sand 2,674 ft., Aux Vases 2,919 ft., Ste. Genevieve 2,964 ft., McClosky 2,976 ft.

OKLAHOMA

Soldier Creek Classified As Allocated Pool

THE Soldier Creek pool of Cotton County has been classified as an allocated field and conservation officers will move into the area shortly to begin potential tests. Rules provide for a 48-hour test—flowing or pumping—with the second 24-hour gage taken as the potential of the well or lease. Lease potentials were established on this basis in the Cache Creek and Essaquanahdale fields about a month ago.

Soldier Creek production is from sand at 1,620-50 ft., and some of the wells have sufficient gas to flow naturally.

T. T. Eason et al have completed a Mississippi lime discovery well east of the Polo pool in Noble County. Their 1 Carter-Boyes, SE NE SE 19-22n-1w, had the Mississippi at 4,790 ft. and flowed 128 bbl. of 41°-gravity oil daily through ½-in. choke following an acid treatment of 1,000 gal. Casing was cemented at 4,897 ft. and perforated at 4,806-15 ft., 4,798-4,806 ft., and 4,800-06 ft.

Oklahoma Natural Gas Co. 1 Oakwood Unit, NW NW NW 6-17n-14w, rank wildcat in Dewey County, is reported to have swabbed 78 bbl. of oil in 24 hours.

OKLAHOMA SUCCESSFUL WILDCATS

Cotton County: W. M. Ungerman 1 Campbell, SW SW SW 4-4s-10w, discovery, pumped 125 bbl. of 35°-gravity oil per day from sand at 1,390-94 ft., no tops reported, TD 1,394 ft.

McClain County: Cities Service et al 1 Lawson "B," C NE SW 22-5n-4w, flowed 1,233 bbl. of 42°-gravity oil per day from 1st and 2nd Bromide sand at 10,768-11,194 ft., through a 28/64-in. tubing choke, Springer 8,610 ft., Mayes 9,210 ft., Woodford 9,300 ft., Hunton 9,500 ft., Sylvan 9,954 ft., Viola 10,155 ft., Bromide dense 10,630 ft., McLish 11,194 ft., Joins 11,902 ft., Arbuckle 11,973 ft., TD 12,398 ft.

Oklahoma County: Denver 1 M. Murphy, C NW SE 11-13n-4w, flowed 15 bbl. of oil per day from Hunton at 6,621-735 ft., Checkerboard 5,580-650 ft., Oolitic lime 5,762 ft., Oswego 6,260-350 ft., Sylvan 6,735 ft., TD 6,735 ft.

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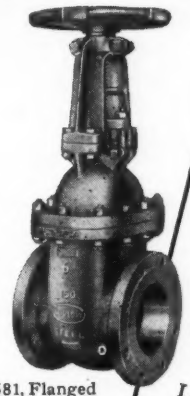

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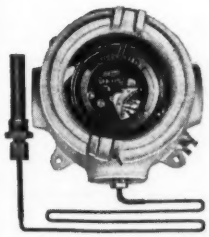

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Whatever your control requirements may be, it will be to your advantage to specify Mercoid.

Our engineering staff will cooperate whenever you have a control problem.

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OKLAHOMA WILDCAT FAILURES

Comanche County: G. C. English and Wirt Frankin, NE NW SW 27-3n-10w, dry, TD 2,562 ft., sand 284-300 ft., lime and granite wash conglomerate 390-95 ft., hard sand 630-32 ft., sand 2,427 ft., Granite wash 2,485-500 ft.

Cotton County: R. E. Barbre et al 1 Bates, SE SE SW NE 36-2s-12w, dry, TD 2,006 ft., sand 1,620-30 ft. and 1,850 ft., Fusilinid-Megargel 1,906-17 ft.

L. H. Choate 1 Landrum, SW SW NE 16-4s-12w, dry, TD 2,515 ft., sand 1,830-41 ft. with a slight show of gas and 1,860-61 ft. with a slight show of gas, Megargel 2,260 ft.

W. A. Delaney, Jr. 1 Hooper, NE NE NE 5-2s-11w, dry, TD 2,505 ft., white sand 2,168-206 ft.

E. P. Griffin 1 Schaetzel, SW SW SW NW 19-2s-11w, dry, TD 2,293 ft., sand 1,680-720 ft., Megargel 2,010 ft., sand 2,192-220 ft.

C. H. Featherstone 1 Waller, SE SE SE NE 23-4s-10w, dry, TD 1,826 ft., broken sand 1,405-50 ft., lime 1,640-53 ft., sand 1,670-703 ft.

Snoddy Brothers 1 Bull, NW NW NW SE 20-3s-9w, dry, TD 2,514 ft., sand 1,278-86 ft. with a show of oil, shaly sand 2,160-200 ft. and 2,442-66 ft.

Garfield County: Cities Service et al 1 Schultz, SE SE NW 7-24n-8w, dry, TD 6,915 ft., Pawhuska lime 3,320 ft., Tonkawa sand 4,180 ft., Lovell lime 4,390 ft., Layton 5,138 ft., Big Lime 5,444 ft., Oswego 5,550 ft., Oolitic lime 6,017-38 ft., Mississippi lime 6,083-560 ft., Woodford 6,585 ft., Sylvan 6,687 ft., Viola 6,786 ft., Wilcox 6,853-70 ft., 2nd Wilcox 6,890 ft.

Garvin County: Dearing & Ellison 1 Hawkins, NW NE SW 20-4n-3w, dry, TD 9,215 ft., Tonkawa lime 6,005-65 ft., Hogshooter 6,385 ft., Checkerboard 6,705 ft., Deese 6,992 ft., sand 7,580-88 ft. with a slight show of oil, Woodford 8,649 ft., Hunton-Herrington 8,858 ft.

Hughes County: Deep Rock 1 Warren, NW SE SW 9-6n-11e, dry, TD 4,959 ft., Booch 2,750 ft., coal 3,040 ft., Gilcrease 3,300 ft., Wapanucka 4,476 ft., Chomwell 4,799 ft., 2nd Cromwell 4,897-942 ft.

Mid-Continent Petroleum Corp. 1 F. D. Brown, NW NW SE 25-8n-8e, dry, TD 3,368 ft., Senora lime 1,509 ft., brown lime 2,629 ft., Booch 2,824-44 ft., Wapanucka-Cromwell 3,332 ft.

Lincoln County: G. R. Hayes 1 Boland, NW NW SW 25-12n-3e, dry, TD 5,500 ft., Avant 2,730 ft., Belle City 2,845 ft., Hogshooter 3,120 ft., Checkerboard 3,460 ft., Oswego 4,230 ft., Skinner 4,345 ft., Earlsboro 4,400-65 ft., Mayes 4,970 ft., Woodford 5,275 ft., Misener 5,300 ft., Sylvan 5,302 ft., Viola 5,413 ft., dolomite 5,468 ft.

McClain County: Mid-Continent Petroleum Corp. 1 Kirkland, SW SE NW 26-5n-2w, dry, TD 7,686 ft., Oread 4,470 ft., Belle City 5,150 ft., Hogshooter 5,530 ft., 2nd Checkerboard 5,830 ft., 1st Deese 5,971 ft., 2nd Deese 6,150 ft., Hunton 6,404 ft., Sylvan 6,504 ft., Bromide dense 7,012 ft., 1st sand 7,162 ft., 2nd sand 7,246 ft.

Oklahoma County: Stanolind et al 1 Macklin, SE SE NW 1-13n-1w, dry, TD 5,930 ft., Pawhuska 2,310 ft., Avant 3,790 ft., Oswego 5,070 ft., Misener 5,550 ft., Hunton 5,553 ft., Sylvan 5,617 ft., Viola 5,712 ft., 1st Wilcox 5,810 ft., 2nd Wilcox 5,911 ft.

Seminole County: Culham Petroleum, Tabor & Coleman 1 E. W. Whitney, SW SW SE 32-10n-8e, dry, TD 4,435 ft., Booch 3,210 ft., Gilcrease 3,395 ft., Wapanucka 3,592 ft., Cromwell 3,610 ft., Mayes 4,020 ft., Woodford 4,150 ft., Hunton 4,202 ft., Sylvan 4,263 ft., Viola 4,361 ft., Wilcox 4,421 ft.

Stephens County: C. W. Smith and D. L. Husted 1 Dotson, C SE SE 25-2s-8w, dry, TD 2,510 ft., sand 1,219-34 ft., 1,577-81 ft. and 1,840-90 ft.

This advertisement is neither an offer to sell, nor a solicitation of offers to buy, any of these securities. The offering is made only by the Prospectus.

Black, Sivalls & Bryson, Inc.

(A Delaware Corporation)

20,000 Shares

4.25% Cumulative Preferred Stock

(Par value $100 per share)

Price: $100 per Share

plus accrued dividends from September 12, 1946

100,000 Shares

Common Stock

(Par value $1 per share)

Price: $10 per Share

Copies of the Prospectus may be obtained from such of the undersigned as are registered as dealers in securities in this State and other dealers as may lawfully offer these securities in this State.

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KANSAS

Large Producer Indicated At Ellis County Prospect

ACCORDING to latest reports The Texas Co. is running casing to the Arbuckle zone in its Ellis County wildcat, the 1 Dreiling, SW SW SW 15-13-17w, after a drill-stem test indicated the well might make as much as 800 bbl. of oil daily. During a 15-minute drill-stem test of a saturated zone encountered at 3,560-83 ft., the well recovered 1,000 ft. of oil. This represented a fill-up rate of about 36 bbl. per hour.

Tests made during the past week at Stanolind Oil & Gas Co. 2 Adams, NE NE SW 9-35-30w, indicate that Meade County may soon have its first commercial oil production. After drilling to a total depth of 6,000 ft., operators plugged back to the upper section of the Mississippi and perforated pipe at 5,826-58 ft. The well showed 1 bbl. of oil an hour.

KANSAS SUCCESSFUL WILDCAT

Rice County: Phil-Han Oil Co. 1 Chase, NW NE NW 28-18s-9w, pumped 100 bbl. of oil per day from Arbuckle at 3,249-55 ft., anhydrite 412 ft., Lansing-Kansas City 2,876 ft., TD 3,255 ft.

KANSAS WILDCAT FAILURES

Edwards County: Cities Service Oil 1 Blattler, SW SW SW 13-25s-16w, dry, TD 4,717 ft., Topeka 3,326 ft., Lansing-Kansas City 3,858 ft., Basal Kansas City 4,203 ft., Pennsylvanian 4,315 ft., Viola 4,417 ft., Simpson shale 4,621 ft., Simpson sand 4,626 ft., Arbuckle 4,683 ft.

Ellis County: Westgate-Greenland Oil 1 Lundy, SE SE SE 16-11s-16w, dry, TD 3,455 ft., anhydrite 974 ft., Heebner 2,979 ft., Lansing-Kansas City 3,028 ft.,

white lime 3,035 ft., conglomerate 3,324 ft., Arbuckle 3,405 ft.

Harper County: Amerada Petroleum 1 Rex Peacock, NW SW NE 32-33s-8w, dry, TD 5,149 ft., Ft. Riley 1,700 ft., Layton 3,744 ft., Lansing-Kansas City 4,020 ft., conglomerate 4,557 ft., Mississippian 4,566 ft., Basal Mississippian 4,854 ft., Viola 4,952 ft., Simpson 5,020 ft.

Marion County: D. T. Ingling 1 Jost, SW SW SW 22-19s-2e, dry, TD 3,032 ft., Mississippian 2,549 ft., Viola 2,943 ft., Simpson 3,025 ft.

C. M. Smith et al 1 G. A. Smith, SE NE SE 19-20s-5e, dry, TD 2,637 ft., Lansing-Kansas City 1,645 ft., Mississippian 2,178 ft., Kinderhook 2,274 ft., Misener 2,451 ft., Viola 2,466 ft., Simpson 2,549 ft., Arbuckle 2,611 ft.

H. J. Uhl 1 Bethel College, NE SW NE 31-21s-2e, dry, TD 2,875 ft., Mississippian 2,846 ft.

Reno County: Drillers Gas 1 O'Hara, C NE SW 30-24s-7w, dry, TD 2,117 ft., Admire sand 2,068 ft.

Rush County: Darby & Bothwell and Iron Drilling Co. 1 Sankey, SW SW SW 18-17s-18w, dry, TD 4,015 ft., anhydrite 1,342 ft., Ft. Riley 2,240 ft., Topeka 3,200 ft., Heebner 3,448 ft., Lansing-Kansas City 3,497 ft., Marmaton 3,773 ft., conglomerate 3,892 ft., Arbuckle 3,928 ft., Basal sand 4,007 ft.

Magnolia Petroleum 1 Christianson, SE SE SW 28-19s-16w, dry, TD 3,848 ft., anhydrite 1,128 ft., Lansing-Kansas City 3,466 ft., Arbuckle 3,771 ft.

Stafford County: Phillips Petroleum 1 Waters, SW NW SE 33-24s-14w, dry, TD 4,434 ft., Heebner 3,536 ft., brown lime 3,657 ft., Lansing-Kansas City 3,708 ft., Basal Kansas City 3,952 ft., conglomerate 4,016 ft., Mississippian 4,039 ft., Kinderhook 4,064 ft., Viola 4,082 ft., Simpson 4,271 ft., Simpson sand 4,283 ft.

NEBRASKA WILDCAT FAILURE

Gosper County: Stanolind Oil & Gas 1 Pauline Schoen, SW SW SW 34-5n-21w, dry, TD 3,537 ft., Topeka 3,065 ft., Lansing-Kansas City 3,258 ft., Granite Wash 3,505 ft., Granite 3,528 ft.

OHIO, KENTUCKY

La Grange Pool Extended One Location Eastward

COLUMBUS.—The La Grange pool in Lorain County was extended a location to the east, along the north side, by the Ohio Fuel 1 Biggs-Butcher, Lot 74. A lens, separate from the main pool, was found at 2,426-37 ft. with a natural gage of 2,110,000 cu. ft.

The Albeon pool in Jackson Township, Ashland County, was extended southeast by the Ohio Fuel 1 M. E. Dickson, Section 3. Clinton sand, 2,829-47 ft. gaged 620,000 cu. ft. natural and the same after shot.

At Reedurban, Perry Township, Stark County, Hanley and Bird in a ½ mile south extension found 426,000 cu. ft. in the Red Clinton at 4,440-77 ft. on Howard et al, Section 23. After shot the well was shut in on casing at 1,000,000 cu. ft.

Ashland field led in locations for the week with 10 reported, followed by Cambridge with 5, Brush Creek 4, Stewart 3, and Mt. Vernon 2. Ashland also led in completions with 8 out of 29.

OHIO WILDCAT FAILURES

Gallia County, Greenfield Township: Portage Producers 1 J. F. Evans, Sec. 20, Clinton 3,053-73 ft., TD 3,208 ft.

Lorain County, Eaton Township: Ohio Fuel 1 C. H. Feirtag, Lot 72, Clinton 2,457-59 ft., TD 2,562 ft.

EASTERN KENTUCKY

ASHLAND. — No completions were reported in the Eastern Kentucky field last week, but there was various activity, with locations in Knott County chiefly and setting up of machinery. Road building and repairs was rather general over the field.

WESTERN KENTUCKY

OWENSBORO. — In Henderson County, the Poole oil field has been extended ¾ mile to the west by the Carter Oil Co. 1 W. B. Adams, NW SE SW 4-N-23. This well was successfully completed in the Cypress sand at 2,226-46 ft., total depth 2,253 ft., during the past week for an initial gage of 283 bbl. of oil daily. Production is now voluntarily held to 100 bbl. daily.

Hoosier Drilling Co. 1 C. A. Dempewolf, NE NE NE 18-P-27, first deep test in the Birk City pool of Henderson County, has been given up as a dry hole after drilling through the Devonian, topped at 3,555 ft., without finding favorable oil or gas shows. The well was carried to a total depth of 4,200 ft.

Western Kentucky completions were at a high level during the past week as operators finaled 12 wells, including 3 oil producers and 9 dry holes. Three wildcats were completed, only one of them successfully. New operations announced during the week totaled 11 and included 4 in Henderson, 6 in Daviess, and 1 in Union County.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Union County: W. Duncan et al 1 Kingdon Coal Mining Co., 5-O-20, elev. 380 ft., pumped 25 bbl. oil, 10-qt. shot, Waltersburg 1,779-85 ft., TD 1,875 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: Hoosier Drlg. Co. 1 C. A. Dempewolf, NE NE NE 18-P-27, dry at 4,200 ft., Ste. Genevieve 1,730 ft., Devonian 3,555 ft., elev. 371 ft.

McCummings Oil Co. 1 E. B. Allen, NW NW SE 5-P-26, dry at 2,305 ft., Glen Dean 1,592 ft., Cypress 1,855 ft., Benoist 2,002 ft., Ste. Genevieve 2,074 ft., McClosky 2,163 ft.

INDIANA

EVANSVILLE.—Locations were announced for two new wildcat operations in Indiana during the past week. These were the Truslor-Taliaferro 1 Sam Himsel, SE NW SE 2-1s-6w, Dubois County, and the National Associated Petroleum Corp. 1 W. Walls, SW NW SE 35-5s-14w, in Posey County. The former is still a location while rotary tools are being rigged up for an early start at the latter.

Only three completions were reported in Indiana during the past week, one a small oil well in the Griffin field of Gibson County, and one dry hole each in Pike and Knox counties. New operations announced during the week totaled 12, and included 5 in Posey County, 2 each in Gibson and Vanderburgh, and 1 each in Dubois, Knox and Spencer counties.

ROCKY MOUNTAIN

Rangely Well Has Oil Show In Shinarump Formation

DENVER.—The west side of the Rangely field where Continental Oil Co. 4 Rooth, NW NW 22-2n-103w, is coring in the Shinarump formation was a point of interest the past week. It is a south offset to the same company's 2 Rooth, a discovery in the Shinarump last May, which flowed 847 bbl. of 38.5°-gravity crude at a total depth of 6,110 ft. The offset well topped the new horizon at 6,233 ft., and cores from 6,233-53 ft. showed good oil and gas saturation, but in two attempts to make drill-stem tests, the packer failed, and coring has been resumed to go through the section to ascertain what lies below the present total depth.

Stanolind Oil & Gas Co. 1-A M. B. Larson, SE SW of 15-2n-103, an east offset to 2 Rooth, the Shinarump discovery, was completed this week in the Weber for 280 bbl. through a 16/64-in. choke. It cored the Shinarump, and in a drill-stem test at 5,726-5,809 ft., open 2 hours, recovered 60 ft. of mud, but no oil or water. Idaho-Sharples-Wasatch 1-16 Larson, NE SE of Section 16, a diagonal offset on the northwest to the Shinarump discovery, is being completed in the Weber.

Elk Springs test.—Continental Oil Co. 1 Smith, SE SW 30-5n-98w, Elk Springs Dome, Moffat County, 28 miles northeast of the Rangely field, which had saturation in the upper part of the Weber, topped at 6,087 ft., made a 4-day swabbing test of the entire Weber section down to 6,311 ft. In the last 24 hours it made 212 bbl. of water and 126 bbl. of oil. It is plugging back to 6,145 ft., 58 ft. below the top, to shut off water preliminary to further testing.

Rangely extension.—Stanolind Oil & Gas Co. 1 Hefley, NW NW 2-1n-102w, outpost on the south side of Rangely, which was completed last month for 162 bbl. in 24 hours, made 402 bbl. of oil through a 20/64-in. choke on final test before going on production. Flowing tubing pressure was 170 lb. and casing pressure 460 lb.

Big well in Cut Bank.—Carter Oil Co. is completing a Madison lime well in North Cut Bank which is making a show for a record in its 1 Doorenhos, C NE NW 12-36-6w. It had the top of the lime at 3,166 ft. and was drilled to 3,181 ft. Casing was perforated with 42 shots at 3,163-77 ft., and the hole filled up at the rate of 10 bbl. an hour. It was then swabbed and made 110 bbl. of oil in 20 minutes, the casing pressure being 70 lb. It is an outpost on the north of the northern group of lime wells, being ½ mile west of 1 Brindley, the discovery well in the Madison. No. 2 Brindley, a quarter of a mile further west, pumped 87 bbl. of oil per day.

Gas in Lysite wildcat.—Sinclair-Wyoming Oil Co. 1 Lysite Unit, NE NW 35-39n-91w, remote wildcat in Lysite area, Fremont County, Wyoming, made a drill-stem test at 9,652-93 ft., open 1 hour, and after recovering 2,500-ft. water cushion, flowed at the rate of 7,500,000 cu. ft. of gas per day with small show of water. This was first show reported and is believed to be in the equivalent of the Shannon sand in Central Wyoming.

New operations. — Eighteen new operations were reported, of which six were wildcats, the latter including several important exploration wells. The Colorado locations included two at Rangely, and one each at Twin Buttes, in Prowers County, and Freezeout district in Baca County. Wyoming had six new operations, one each in Big Muddy, Frannie and Garland, and wildcats on Hidden Dome, Washakie County, Corley Dome in Hot Springs County, and Herrick Dome, in Albany County. Montana had two at Bowdoin, three in Kevin-Sunburst, and one each in Cut Bank and Cedar Creek. A shallow wildcat in South Dakota completed the list.

COLORADO WILDCAT FAILURE

Freezeout, Baca County: Sharples-Huber-Frontier 1 Murray, SW SW SE 26-29s-50w, TD 5,605 ft., dry, formation tops not released.

WYOMING WILDCAT FAILURE

Lake Creek, Hot Springs County: Continental Oil Co. 2 Government, SW SE SW 27-43n-91w, TD 4,465 ft., probably in the Madison, dry, top Tensleep 3,679 ft.

MONTANA WILDCAT FAILURE

Nine Mile, Big Horn County: H. L. Hunt 1 Kendrick Cattle Co., SW SE SE 24-1n-34e, TD 6,092 ft., dry, top Tensleep 6,085 ft.

UTAH WILDCAT FAILURE

Wildcat, Uintah County: B. V. Bullock 1 Angus, C SW NE 36-1s-1e, TD 2,107 ft., dry.

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WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

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DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

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It costs only a few cents to use RECTORSEAL on thread connections to make them permanently leak-proof. This precaution when making up connections will prevent such costly operations as pulling strings of pipe, taking up drilling and flow lines, breaking out christmas tree and separator connections, to stop leaks which develop in connections not properly protected.

RECTORSEAL not only costs little to use, but is easy and quick to apply. It can be swabbed or brushed directly from the container.

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RECTORSEAL
THE POSITIVE LEAK PREVENTER

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Drilling Contractors

B. & B. Drilling Co. has been awarded contract by James N. Crofton of Los Angeles for his second venture in the East Antioch sector of Garvin County, Oklahoma, a Bromide sand test to be known as the 1 Plummer, SE SE SE 1-3n-2w. The test is located about 1¾ miles north of production in the East Antioch pool.

Summit Drilling Corp. is rigging up rotary for a test 1 mile north of the East Orland pool in Payne County, Oklahoma. It is the 1 Buetow, SE SE SW 2-19n-1w, situated on a lease forming part of a 500-acre concentration in the area held jointly by Olean Petroleum Co. and Gardner Petroleum Co.

Kiowa Drilling Co. has contract for a new Sumner County, Kansas, wildcat, the G. B. Cree et al 1 Frantz, NW NW NE 35-30-2w. The new test is located 4 miles southeast of the Latta pool in the northern part of the county.

T. W. Appleby Drilling Co., Odessa, Tex., will drill Lario Oil & Gas Co.'s outpost to Fuhrman - Mascho field of south-central Andrews County, Texas. It is the 2-A Lockhart & Brown, in Section 25, Block A-42, PSL Survey, and will be a 4,600-ft. rotary test.

Richards & Rowan, Ventura, has received contract to drill Republic Operator, Inc., 1 fee in Section 13-5n-17w, in the Castaic area, Los Angeles County, north of Del Valle pool.

Brown Drilling Co., Long Beach, has obtained a contract to drill seven wells in Huntington Beach field, Orange County, for account of Standard Oil Co. of California.

K. L. Kellogg & Sons, Long Beach, has contracted to redrill Ohio Oil Co. 3 Vasquez in Del Valle field, Los Angeles County. The contractor has been engaged to redrill General Petroleum Corp. 16 Santa Fe community and 9 Santa Fe.

Hinkle Drilling Co., discoverer of the new North Port Neches field, Orange County, Gulf Coast Texas, has staked location for a second test, offsetting the discovery well to the northwest. The 2 G. M. Adcock, in the John Stephenson Survey, will go to 9,250 ft.

Pacific American Oil Co., Long Beach, is the contractor on Kohlbush & Morton 1 Shasta Petroleum Co., in Torrance field, Los Angeles County. This is a redrilling job.

Kingery Brothers Drilling Co. and McElreath & Suggett will drill the F. W. Brown heirs, a wildcat 2 miles west of the town of Callisburg and 4 miles south of the Walnut Bend field in Cooke County. It will be a rotary test, to 6,000 ft., which is expected to carry it through producing sections at Walnut Bend.

Mohawk Drilling Co.'s Jones & Stasney 1 E. A. Hicks, O.A.L. Survey, Jones County, West Central Texas, a Palo Pinto test that was dry

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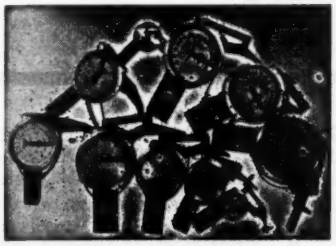
LINE SCALES



With a Line Scale you know the pull on the line, and the weight on the bit in pounds. Accurate, sensitive, rugged and economical.

Line Scales are dependable, even in areas of rapid temperature changes. Repeated tests prove the accuracy of Line Scale readings under all working conditions.

LINE SCALE CO., Inc.
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Gulf Coast Representative: Hiram Wheeler, Box 8043, Houston 4, Texas

VARCO

UNITIZED ROTARY DRILL PIPE SLIPS

For 2⅜"-6⅝" drill pipe

(1) With patented "Varco" buttons. (2) Uniform load distribution. (3) Maximum grip area. (4) Long enduring life. (5) Light weight. (6) Chrome alloy heat-treated steel. (7) Forged alloy steel handles.

Abegg & Reinhold Co. Ltd.

2533 East 26th Street,
Los Angeles 11, Calif.
Mid-Continent Sales Offices:
1502 Maury St., Houston 10
P. O. Box 4413, Oklahoma City

at 3,403 ft., is now drilling below 3,800 ft. on an indefinite contract that may explore the Caddo lime and the Ellenburger.

Dunlap & Graham, Long Beach, will redrill the lower Ashton zone for Standard Oil Co. of California at B-13 Huntington, in Huntington Beach field, Orange County.

M. Thornbury, Inc., Fillmore, Calif., has been issued a permit to engage in the drilling contract business. Directors of the corporation are William Thornbury, W. H. Geis, and F. G. Bruce.

Stegall Drilling Co., Kilgore, Tex., will drill the A. P. Merritt 1 Henry Nors, F. A. Tabor Survey, 3 miles southeast of Aquilla in Hill County, to the Smackover lime, expected around 3,500 ft. It is a wildcat test, with Stegall having an interest in the well.

CALENDAR

November

Houston Nomads, Old College Inn, Houston, November 11.

A.P.I. annual meeting, Stevens Hotel, Chicago, November 11-14.

Los Angeles Nomads, Mayfair Hotel, November 13.

American Welding Society, annual meeting, Atlantic City, N. J., November 18-22.

American Society for Metals, annual meeting, and National Metal Exposition, Atlantic City, N. J., November 18-22.

American Institute of Mining and Metallurgical Engineers, iron and steel division, and institute of metals division, annual fall meeting, Atlantic City, N. J., November 18-22.

Mid-Southeastern Gas Association, Raleigh, N. C., November 21-22.

Rocky Mountain Oil and Gas Association, annual meeting, Shirley-Savoy Hotel, Denver, November 21-23.

Independent Natural Gas Association of America, annual meeting, Blackstone Hotel, Fort Worth, November 22.

December

American Society of Mechanical Engineers, New York, December 2-6.

New Mexico Oil and Gas Association, annual membership meeting, Artesia, N. M., December 4.

Houston Nomads, Old College Inn, Houston, December 9.

Interstate Oil Compact Commission, winter quarterly meeting, Dallas, December 9-11.

Oil Dealers Association of Arkansas, Hotel Marion, Little Rock, December 10.

Los Angeles Nomads, Mayfair Hotel, December 11

American Chemical Society, meeting of Texas sections, Dallas, December 12-13.

Mid-Continent Oil and Gas Association, annual ad valorem tax forum, Plaza Hotel, San Antonio, Tex., December 16-18.

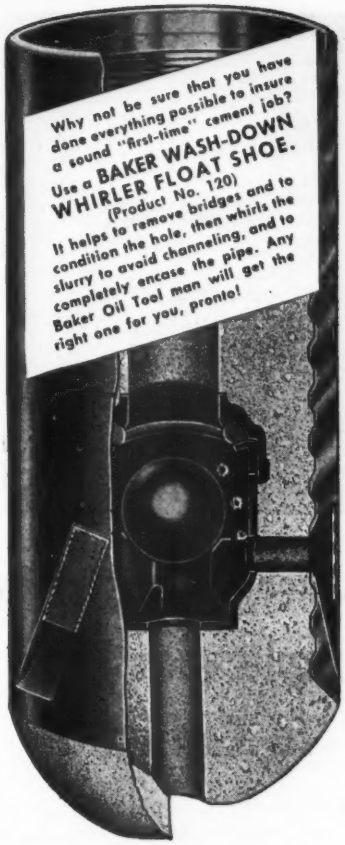
1947

January

Society of Automotive Engineers, annual meeting and engineering display Book-Cadillac Hotel, Detroit, January 6-10

March

American Institute of Mining and Metallurgical Engineers, annual meeting, and World Conference on Mineral Resources, Waldorf Astoria Hotel, week of March 17.


Why not be sure that you have done everything possible to insure a sound "first-time" cement job?
Use a BAKER WASH-DOWN WHIRLER FLOAT SHOE.
(Product No. 120)
It helps to remove bridges and to condition the hole, then whirls the slurry to avoid channeling, and to completely encase the pipe. Any Baker Oil Tool man will get the right one for you, pronto!

WEB WILSON *Tong Dies*

"IT'S A WILSON"

The BEVELLED ENDS allow the WEB WILSON Tong Die to glance off of a tool joint and minimize the danger of pushing the Tong Die out of the die slot. Full 5¾" length allows the die slot to be completely filled with one solid die.

SEE COMPOSITE CATALOG FOR COMPLETE DETAILS

WEB WILSON *Oil Tools*
W. W. WILSON BUILDING
HUNTINGTON PARK, CALIF.

PERSONALS

Baker Successful In Exploration Work In California

V P. BAKER, president of Independent Exploration Co., and one of the founders of the company, has had a varied career and with E. B. Hall probably has drilled more wells in the Wilmington, California, field than any other contracting firm.

Shortly after discovery of Wilmington field Hall-Baker Co. entered into a contract with Union Pacific Railroad Co. and for several years represented this company in the actual drilling of new wells. Baker was born in Lead, S. D., in 1893 and has been a resident of Los Angeles the past 45 years. He worked in oil fields and drilled mineral prospect holes in the desert area from 1911 to 1917.

He entered the U. S. Naval Air Service in 1917 and received his discharge in 1919. A year later he became drilling superintendent for Montacal Oil Co. and remained in that capacity until 1923 when he entered partnership with E. B. Hall doing leasing and exploration for oil and gas. Baker's success in discovering several important fields and pools in California is regarded as due to his untiring efforts, together with those of his associates.

O. C. Yates has been elected president of the newly formed Lloydminster Petroleum Association, made up of operators in the Saskatchewan and Alberta sections of the Canadian field. Other officers elected include: **V. U. Miner,** solicitor; **F. H. Edmunds,** executive secretary; **W. F. McWhinney,** secretary; and **J. H. Howes, J. L. Loveseth, C. E. Mills,** and **W. D. Williams,** directors.

Vincent W. Finch, technical assistant in the San Francisco office of Shell Oil Co., Inc., has been promoted to senior geologist in the Ventura coastal division, and **Arthur S. Huey,** geologist in the San Joaquin division at Bakersfield, Calif., has been appointed senior geologist. **Walter H. Clemmons,** pipe-line clerk at Shell's Los Angeles office, has been promoted to pipe-line dispatcher.

C. K. Gamble, vice president and director of Standard-Vacuum Oil Co., is a recipient of the highest award which the President of the United States can give a civilian. It is the Order of Merit, conferred on him in San Francisco by the commanding general of the Sixth U. S. Army. The award was for his work in organizing and directing (as high commissioner) the American Red Cross in South and Southwest Pacific during the war.

Andrew F. Carter, president of United Overseas Petroleum Co., Ltd., jointly owned by Standard Oil Co. of California and The Texas Co., returned from his London headquarters on the maiden voyage of the Queen Mary and is now in New York. Carter, formerly a rear admiral in the Navy, was executive officer of the Army-Navy Petroleum Board during the war. He plans to return to London shortly.

M. P. Paret, Jr., engineer at the El Paso, Tex., refinery of Standard Oil Co. of Texas and supervisor of the Ward County natural gasoline plant, has been elected a vice president of the company, in charge of manufacturing, sales, and natural gasoline operations. He succeeds **H. G. McIntyre,** who became president of the company last August. Paret was also elected a vice president and director of Pasotex Pipe Line Co. He had previously been pipe-line superintendent of the company.

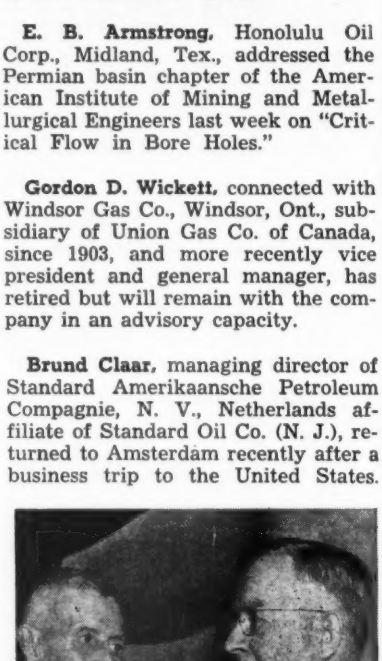
G. R. Axelson, sales - maintenance supervisor for Standard of Texas, succeeds Paret as pipe-line superintendent of Pasotex. **J. H. Kitchen,** refinery superintendent of Standard of Texas, and **L. A. Scott,** El Paso attorney, have been elected directors of Pasotex.

George N. Powell, Oil City, Pa., traffic manager of Southern Pipe Line Co., has retired after 34 years' service with the company.

E. B. Armstrong, Honolulu Oil Corp., Midland, Tex., addressed the Permian basin chapter of the American Institute of Mining and Metallurgical Engineers last week on "Critical Flow in Bore Holes."

Gordon D. Wickett, connected with Windsor Gas Co., Windsor, Ont., subsidiary of Union Gas Co. of Canada, since 1903, and more recently vice president and general manager, has retired but will remain with the company in an advisory capacity.

Brund Claar, managing director of Standard Amerikaansche Petroleum Compagnie, N. V., Netherlands affiliate of Standard Oil Co. (N. J.), returned to Amsterdam recently after a business trip to the United States.



The Texas Co. is holding 29 dinners throughout the United States this fall to pay honor to the old-timers with the Texas company organization. One was given last week in the Rice Hotel in Houston with more than 400 company employes, retired employes, and guests attending. Principal speaker was James Tanham, New York, vice president in charge of industrial and public relations. In the picture, left, is J. C. Colligan, Henderson, retired employe who holds the distinction of being the first man to be entered on The Texas Co. payroll. He joined the company at Beaumont shortly after the Lucas gusher came in. Right is L. E. Barrows, Houston manager of the producing department of the company. In its entire year's program, The Texas Co. will present a total of 305 30-year awards and 366 25-year awards

Ben Hurlbutt and **Frank Herring** have formed Ben-Franklin Exploration, Inc., in Wichita, Kans., specializing in core-drill exploration.

Charles Speth, board chairman of Standard American Petroleum Co., affiliate of Standard Oil Co. (N. J.) in Belgium, is in the United States on a business trip.

Joseph A. Holmes, Caracas representative for International Petroleum Co., Ltd., was in Canada recently visiting International's head office at Toronto.

E. R. Raphael, manager of the southern California division, Shell Oil Co., Inc., has been elected a director of the All-Year Club of Southern California, Ltd.

D. C. Richardson, Jr., president of D.C.R. Oil Co., Shreveport, has opened an office at 1817 North Second Street in Abilene, Tex. The Shreveport office will be continued.

F. W. Abrams, chairman of the board of Standard Oil Co. (N. J.), has been named chairman of the industry and manufacturing division of New York's fund-raising campaign for the USO.

Maurice Bridgeman, from Anglo-Iranian Oil Co., Ltd.'s London office, was in Teheran recently on a business trip and talked with Iranian Government officials in connection with Anglo-Iranian's concession there.

W. C. Nye has joined Cooper Gas Co., San Angelo, Tex., as chief engineer. Nye has been with the Cardinal Division of Helmerich & Payne, Inc., and its successor, Cardinal Oil Co., for nearly 15 years.

Dr. C. C. Brown, chief of the petroleum economics division in the coordination and economics department, Standard Oil Co. (N. J.), has been elected vice president of the World Trade Foundation of America.

Dr. Arno C. Fielder, chief of the fuels and explosives branch of the Bureau of Mines, has been awarded the Percy Nichols award by the American Institute of Mining and Metallurgical Engineers and the American Society of Mechanical Engineers, for devising methods for appraising the values of different coals in making oil and gasoline and for yielding coke and gas.

E. V. Watts, production engineer at Vernon, General Petroleum Corp., has been appointed general chairman for the 1947 spring meeting of the Pacific Coast district, Division of Production, American Petroleum Institute. **M. W. Morris,** Southern California district engineer, Standard Oil Co. of California, is the A.P.I. district chairman.

Maynord H. Stieg, district manager for Phillips Petroleum Co. at Houston, has been appointed district geologist for West Texas and Southeast New Mexico at Midland. Stieg has been with Phillips 8½ years and earlier was with Shell Oil Co., Inc., and Houston Oil Co.

H. H. Ross, operations manager for Oklahoma Natural Gas Co., and **Paul Sticelber,** manager of the land and geology departments, have been appointed vice presidents of the company following the resignation of **C. U. Daniels** as vice president.

H. A. Grimes, manager of International Petroleum Co., Ltd., in Peru, returned to Lima in October after a business trip to the United States and Canada.

J. L. Kalb, former director and vice president of Creole Petroleum Corp., and now assistant manager of Tropical Oil Co. in Colombia, has returned to Bogota after a business trip to the United States and Canada.

Joseph T. Houghton, formerly assistant general superintendent of the Belot refinery, Standard Oil Co. of Cuba, has been transferred to the Campania Nativa de Petroleos, S.A., as a refinery executive. Both companies are affiliates of Standard Oil Co. (N. J.)

Eugene Somoff, electrical engineer, has been appointed technical-service engineer of the American Standards Association in New York. He will collect and supply technical information concerning American standards and those of other countries

F. I. L. Lawrence, director of research and development, Kendall Refining Co., Bradford, Pa., has been appointed a member of the American Petroleum Institute committee on analytical research, it was announced at a meeting of the Pennsylvania Grade Crude Oil Association's technical advisory committee last week in Warren, Pa.

Thomas W. Palmer, head of the Latin-American legal staff of Standard Oil Co. (N. J.), last week was awarded the Order of the Liberator with rank of commander by **Dr. Enrique Gonzales - Navas,** Venezuelan consul general in New York. The award, the highest honor Venezuela gives a foreigner, was accompanied by a citation for Palmer's contribution in promoting better relations between Venezuela and the United States. In 1936 Palmer was decorated by the Brazilian Government with the Order of the Southern Cross for similar activities.

C. E. Skiles, independent operator of Hutchinson and Wichita, Kans., has opened an office in Oklahoma City.

Bentley Burr, recently released from the Army, has been appointed division personnel director for Ohio Oil Co. at Grand Rapids, Mich.

C. V. LANE

C. V. Lane, San Francisco, has been appointed manager of the purchase and stores department, Standard Oil Co. of California, succeeding **L. B. Waters.** Lane was formerly assistant manager of the department, a position now occupied by **A. R. Eimer.**

Shifts

W. W. Gifford, superintendent, Rocky Mountain Drilling Co., Avenal, Calif., to Bakersfield, Calif.; **George E. Trimble,** engineer, The Texas Co., Penwell, Tex., to Wichita Falls; **James C. Rogers,** foreman, Humble Oil & Refining Co., Freer, Tex., to Pleasanton, Tex.; **Guy S. Daniel,** geologist, The California Co., Mission, Tex., to Prichard, Ala.; **H. B. Howard,** engineer, Phillips Petroleum Co., Amarillo to Midland, Tex.; **Ted J. Nowak,** engineer, Atlantic Refining Co., Dallas, to Redonda Beach, Calif.

John A. Mackintosh, geologist, The Texas Co., Houston to Corpus Christi; **George T. N. Roberts,** engineer, Shell Oil Co., Inc., Graham, Tex., to Tulsa; **Harry A. Dupont,** engineer, Phillips Petroleum Co., Odessa, Tex., to Plaquemines, La.; **J. T. Humphries,** superintendent, N. H. Wheeless Drilling Co., Bastrop, La., to Natchez, Miss.; **A. E. Barry,** engineer, Stanoling Oil & Gas Co., Jennings, La., to Lafayette, La.

E. Clarence Oden, engineer, Cities Service Refining Corp., Lake Charles, La., to Cullman, Ala.; **E. Glen Albright,** foreman, Atlantic Refining Co., Bay Minette, Ala., to Rockport, Tex.; **W. J. Matyeh,** foreman, Sheehan Pipe Line Construction Co., Crete, Ill., to Tulsa; **Charles W. Foust,** engineer, Standard Development Co., Newark, N. J., to Cranford, N. J.; **W. Blewett Chenault,** engineer, Sinclair Refining Co., Munster, Ind., to Houston.

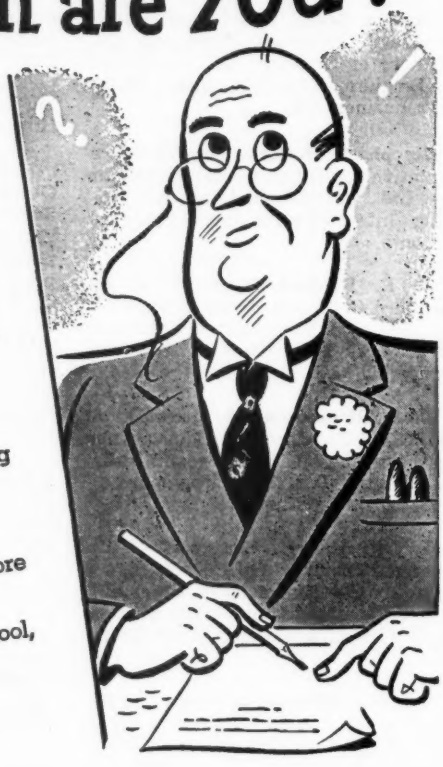
Carl E. Lee, superintendent, Kerr-McGee Oil Industries, Inc., Artesia, Colo., to Baggs, Wyo.; **E. L. Smart,** superintendent, Stanolind Oil & Gas Co., Kingman, Kans., to Pratt, Kans.; **W. R. Newman,** vice president, Burlington Oil Co., Cheyenne, Wyo., to Denver; **Hiram J. Wallace,** foreman, Gulf Oil Co., Three Sands, Okla., to Drumright, Okla.; **James M. Garlick,** engineer, Shell Oil Co., Inc., Oklahoma City to Perry, Okla.

EXECUTIVES:

How Good a Salesman are YOU?

TEST YOURSELF WITH THIS PRODUCT—

Guaranteed to Please Every Customer



CHECK HERE how many of your employees are buying U.S. Savings Bonds regularly

HERE'S HOW YOU RATE according to national averages

- ☐ **90%** or more ➡ No one needs to tell you anything about selling.
- ☐ **80%** or more ➡ Excellent.
- ☐ **70%** or more ➡ Not bad. Just apply a little more effort.
- ☐ **60%** or less ➡ This wasn't a high mark in school, either.

The "PRODUCT"—U. S. Savings Bonds—is easy to sell, because it offers every prospect a guaranteed means of making money. Each unit can produce $4 for every $3 of purchase price.

The MARKET consists of all your employees. It is an eager market, as shown by surveys—which indicate that 85% of all participants in the Payroll Savings Plan want the plan continued.

The REWARD is twofold: By helping your employees build personal security, you help assure that they will be happier, more stable—more productive on the job. And you help *all* of us, including yourself, because every Bond you sell helps to check inflationary tendencies.

Are You Using These Booklets?

If not, or if you wish additional copies, just ask your State Director of the Treasury Department Savings Bonds Division.

THE PEACETIME PAYROLL SAVINGS PLAN—A booklet, published for key executives by the Treasury Department, containing helpful suggestions on the conduct of your payroll savings plan for U.S. Savings Bonds.

THIS TIME IT'S FOR *YOU*—A booklet for employees . . . explaining graphically how the payroll savings plan works . . . goals to save for, and how to reach them with Savings Bonds.

The Treasury Department acknowledges with appreciation the publication of this message by

THE OIL AND GAS JOURNAL
Tulsa 1, Oklahoma

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council

Equipment Men in the News

Southern Gas Adds L.P.G. Conversion Service

A new department for conversion of manufactured-gas plants, particularly of the coal, oil, and water-gas types, to propane and butane-air operations is announced by Southern Gas & Equipment Co., Tulsa. Robert B. "Bob" Leydig has been appointed general manager of this department. Leydig had recently been affiliated with Walco Engineering & Construction Co., Tulsa.

International Harvester Arranges Special Southwest Exhibits

International Harvester Co.'s motor-truck division unveiled its new heavy-duty highway and off-highway trucks in Tulsa on October 15. The new trucks were shown to oil men and other operators of heavy-duty equipment. Sam E. Houston, of the consumer relations department, announced special exhibits have been arranged in other areas in the Southwest serving the oilfield, including Wichita (October 22), Oklahoma City (October 29), Amarillo (November 5), Dallas (November 11), Sweetwater (November 19), San Antonio (November 26), Houston (December 3), and Shreveport (December 10).

SKF Appoints Gracey As Training Director

Appointment of Harry F. Gracey as training director of SKF Industries, Inc., is announced by John Lawrence, factory manager for the ball and roller-bearing company. Gracey, who will have charge of SKF's factory-wide organizational development program, was formerly in charge of the industrial, foreign trainee, and engineering-student training programs of the Victor division, Radio Corp. of America.

Schafer New Sales Manager Of Ideal Industries

Ward R. Schafer has been named general sales manager of Ideal Industries, Inc., Sycamore, Ill. Schafer leaves his post of vice president in charge of sales of Edison General Electric Appliance Co., Chicago, for the new position.

Indig Factory Export Representative

Victor A. Indig, factory export representative for Patterson-Ballagh, Lane-Wells, Overstrom, and Commercial Iron Works, recently visited his principals in the Los Angeles area. His offices are in the Russ Building, San Francisco.

Carter in Venezuela

Edward L. Carter, export sales representative for Shaffer Tool Works, Tulsa Boiler & Machinery Co., W. C. Norris, Manufacturer, Frank Wheatley Pump & Valve Manufacturer, Ben F. Kelley Co., and the Air Operated Rotary Division of McEvoy Co., is now visiting the operating fields in Venezuela.

Acid Engineering Opens New Acidizing Station

The Acid Engineering Co. of Kansas has opened an acidizing station at Lakin, Kans., and will offer oil and gas-well chemical services for southwestern Kansas. Steele S. Neely, formerly with Hinderliter Tool Co., is resident agent and sales representative, while E. S. (Jack) Villines is coowner and general manager with offices at Garden City and Lakin, Kans.

Skinner Foreign Representative For Homco

D. V. Skinner has been selected as foreign representative of Houston Oil Field Material Co., Inc. Skinner was formerly sales and public-relations man for the manufacturing, cutting and fishing tool, and directional-drilling service departments of Homco. He has transferred his offices from Houston to Caracas, Venezuela.

Ace Elliott Forms Tool Company

Ace Elliott has announced the establishment of Ace Tool Co. to specialize in casing heads, tubing heads, valves, and a special line of high-pressure valve lubricating equipment. The new company offers well-completion service and consultation as an adjunct to its line of equipment. Headquarters have been established in Houston.

Penn Promotes Cameron to Vice President

D. G. Cameron, who joined Penn Electric Switch Co., Goshen, Ind., 2 years ago as chief engineer, was recently elevated to vice president in charge of manufacturing. His newest assignment embraces the manufacturing operations of Penn's Goshen, Canadian, and Indianapolis factories. Fred W. Hottenroth has been named to succeed Cameron as chief engineer.

Bowser Forms New Division

The newly formed Industrial Pump Division of Bowser, Inc., has taken over the company's plant at Angola, Ind., according to an announcement by J. B. Trotman, general manager of the division.

Timken Transfers Proffitt

Russell P. Proffitt, since 1933 Chicago divisional manager of The Timken Roller Bearing Co., has been transferred to the Washington, D. C., office as district manager.

Times Writer Joins U. S. Steel

Kenneth Austin, financial writer for the New York Times since January 1927, has joined the public relations staff of United States Steel Corp.

Security Executives Visit Mid-Continent and Rocky Mountains

OTTO HAMMER

KEN SWART

Otto Hammer, president, and Ken Swart, chief engineer for Security Engineering Co., Inc., recently returned from a business trip to the company's branch offices and distributing centers in West Texas, Colorado, and Wyoming.

Robinson New Security Assistant Sales Manager

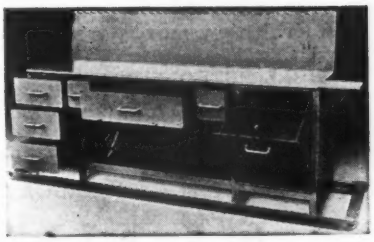
L. G. "Pat" Robinson has been elevated from California sales manager to assistant sales manager of Security Engineering Co., Inc., Whittier, Calif. While with the company Robinson has been stationed in Illinois, Canada, the Gulf Coast, and the Mid-Continent.

Patterson Transferred to Shreveport

Pat Patterson, field representative for Halliburton Oil Well Cementing Co. in Salem, Ill., has been transferred to Shreveport, where he will be the assistant division superintendent. He will be replaced at Salem by H. T. Hoisington.

OWEN

TYPE "A" WORK BENCHES



REDUCE DRILLING EXPENSES

These all-steel, all-welded benches provide a convenient place for all hand tools on the rig. They save drilling dollars by reducing loss and damage of tools and by saving time ordinarily spent in looking for misplaced tools.

Six big drawers and a rag bin provide storage space for all the tools on your rig. Drawers are weatherproof and mounted on rollers for easy operation.

Owen Work Benches are sold through all supply stores and distributed in California by Howard Supply Co. Order one for each rig you operate . . . **they're available for immediate delivery.**

OWEN TOOL COMPANY
ROUTE 9 BOX 800-B V: 2-4341
HOUSTON TEXAS

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads except Situations Wanted, 10 cents a word. Minimum charge, $2.00 per insertion.
Situations Wanted ads, 5 cents a word. Minimum charge, $1.00 per insertion.
Centered Line, any ad, 75 cents.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$9.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR SALE: Diesel Engine powered rotary drilling rig, suitable for 5,000′ drilling Priced cheap for quick sale. Phone 306. Box 1360, Seminole, Oklahoma.

FORT WORTH Model D Spudder with built-in shear poles and Climax Model R-41 120 H.P. gas-gasoline engine. Travco Equipment Co., 110 Midco Bldg., Tulsa, Okla Phone 5-2251.

60 HP PATTEN Brothers Engine, direct connected compressor, vacuum. Goulds water pump, scrubber and accumulator tanks, gas traps, 4000 gal. iron tank. Meter and buildings. Donald F. Baker, 131 North Xanthus, Tulsa, Oklahoma.

FOR SALE

6—125 H.P., 250# W.P. Oil Field Boilers, Hartford Test A-1 Condition.

ENGLE PETROLEUM, INC.
P.O. Box 502
Salem, Illinois

EQUIPMENT FOR SALE

FOR SALE OR RENT: 8,000′ 4½″ A.P.I Full Hole Drill Pipe. Melton Well Service. Seminole, Oklahoma.

BUBBLE TOWERS, Agitator, Jenkins Cracking Unit, Condenser Boxes, Flange Fittings and series 150 fittings, Omar Refining Co., Garber, Oklahoma.

FOR SALE: Model 55 Wichita Spudder less mast with PA-100 International engine in good condition. Located near Pampa, Texas. Nabob Oil & Gas Company, Box 448, Amarillo, Texas.

AVAILABLE FOR IMMEDIATE DISPOSAL, five 2½ to 5 x 10 used Gaso side pot enclosed horizontal duplex power pump for pressure ranging from 600 to 1400 lbs. working pressure with a capacity 38 to 175 gallons per minute. QUAKER STATE OIL REFINING CORP. Box 337, Bradford, Penna.

FOR SALE: 5,000′ 4½″ OD 16.60# Range 3 drill pipe with regular tool joints; 6,100′ 4½″ OD 16.60# Range 2 drill pipe with A.P.I. F.H. tool joints. Also 1 steel drilling rig complete with boilers and drill pipe capable of drilling 6,000′. 7 Nixon Gas Lifts complete with weights, lifts and line. Wire, write or phone Louisiana Iron & Supply Co., Shreveport, La.

VALVES—FITTINGS
STEEL AND CAST IRON
ALL SIZES AND PRESSURES
VICTORY SUPPLY COMPANY
Phone 5-2073 P.O. Box 754
Tulsa, Oklahoma

BLOWOUT PREVENTORS FOR SALE

2—10¾″-600 Pound Test Type 38 Shaffer.
2—13⅜″-4000# Test Type 34 Shaffer.
2—13⅜″-4000# Test Type SDA Cameron.
Other Types and Pressures for sale or rent.

EARLE ADKISON
P.O. Box 814, Phone Fax 9339
Houston, Texas

EQUIPMENT FOR SALE

COUPLINGS—150 pcs. 9⅝″ OD x 8 Rd. New, perfect, seamless, never used. Quotation on definite inquiry. JULIUS M. FOGELMAN, Reading, Penna.

FOR SALE: Double drum Dietle casing puller with Fordson power. 50′ mast and tools. R. S. Hanson, 206 Petroleum Building. Wichita, Kansas. 2-4343.

PULLING UNIT—1936 Franks ET 5000′ skid unit with SRK Waukesha motor mounted on 1936 C50 International truck. Ready to work. $2,000 cash. Mumy Well Service, Reed City, Mich. Phone 586.

FOR SALE: 24 Pumping Units. All types & sizes. New and used. Bridgeports, Jensens, Americans, Atlas, M.I.W. with or without Power. Glenn Supply Co., 3600 Sand Springs Road. Phone 3-9607, Tulsa, Okla.

FOR SALE: 2 RXIV Le Roi 8 Cylinder 6¾″x7″ 225 HP. Engines completely overhauled with starting engines with or without Twin Disc clutches. Jack Gwynn Company, Ltd., Phone 6196. Wichita Falls, Texas

1 U M Allis-Chalmers Tractor pulling unit with 48′ mast pole—$2500.00.
1 U E Allis-Chalmers Tractor pulling unit with 48′ mast pole—$2750.00.
Write Box 97, Fox, Oklahoma.

FOR SALE: New Allis-Chalmers pulling unit mounted on 1942 Ford, long wheel base. Truck has new 1946 motor and eaden rear axle complete with new lines, tools, sand pump and sand lines. Priced reasonable, Box 397, Mattoon, Illinois, Phone 2430, Mattoon, Illinois.

FOR SALE

10—30′x38′, 200,000 gallon capacity steel storage tanks, built in 1942.
3—8′x40′, new propane storage tanks.

ROGERS AND WRIGHT
715 Peoples Exchange Building
P.O. Box 1572
Charleston 26, West Virginia
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